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Nuclear Science Abstracts

Vol. 7 No. 8
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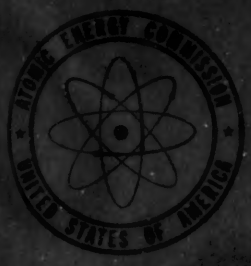
Apr. 30, 1953



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ERRATA

NSA, Vol. 5, No. 11, p. 467. In abstract 2908, W. M. Jarmie should be W. N. Jarmie.

NSA, Vol. 5, No. 17, p. 692. In abstract 4361, Leonard Koengold should be Leonhard Korngold.

NSA, Vol. 5, No. 22, p. 1004. In abstract 6784, Millard E. Reyner should be Millard L. Reyner.

NSA, Vol. 6, No. 1, p. 2. In abstract 7 and in Reports Reference List, p. v, report AECU-1715, Medical Clinic, Peter Bent Brigham Hospital should be Peter Bent Brigham Hospital, Medical Clinic, and Howard H. Spiro should be Howard M. Spiro.

NSA, Vol. 6, No. 1, p. 2. In abstract 9 and in Reports Reference List, p. v, report AECU-1719, Medical Clinic, Peter Bent Brigham Hospital should be Peter Bent Brigham Hospital, Medical Clinic.

NSA, Vol. 6, No. 3, p. 123. In abstract 979 and in Reports Reference List p. viii, report NP-3525, Colorado Agriculture and Medical Coll. should be Colorado Agricultural and Mechanical Coll.

NSA, Vol. 6, No. 21, p. 734. In abstract 5985 and in Reports Reference List, p. vi, report NYO-3380, Bruno H. Perfetti should be Bruno M. Perfetti.

NSA, Vol. 6, No. 24A, p. 830, Colorado Agriculture and Medical Coll. should be Colorado Agricultural and Mechanical Coll.

NSA, Vol. 6, No. 24A, p. 853, Medical Clinic, Peter Bent Bingham Hospital should be Peter Bent Brigham Hospital, Medical Clinic.

NSA, Vol. 6, No. 24A, p. 868, Spiro, Howard H. should be Spiro, Howard M.

NSA, Vol. 7, No. 5, p. 5 of Index. The item AECU-2331, 6-3069, Science 115, 284-5(1952) should be deleted.

NSA, Vol. 7, No. 6A, p. 5 of Index. In the journal reference for AECD-3333, 192-4(1952) should be 116-19 (1953). In the journal reference for NYO-3187, (1952) should be (1953).

REPORTS REFERENCE LIST

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The abstract number for each report is listed at the upper right of the entry. If the number bears an asterisk, the report is title listed only and no abstract is included.

USAEC DECLASSIFIED REPORTS

AECD-3501 2355
Oak Ridge National Lab., Y-12 Area
THE ELECTROMAGNETIC CONCENTRATION OF THE STABLE ISOTOPES OF MERCURY, by L. O. Love and W. E. Leyshon. Aug. 23, 1951. Decl. with deletions Feb. 24, 1953. 49p. (AECD-3501; Y-805)

AECD-3502 2356
Oak Ridge National Lab., Y-12 Area
THE ELECTROMAGNETIC CONCENTRATION OF SAMARIUM, by L. O. Love and W. A. Bell. Oct. 4, 1950. Decl. with deletions Feb. 24, 1953. 31p. (AECD-3502; Y-666)

AECD-3503 2426
Carbide and Carbon Chemicals Co. (Y-12)
FAR-ULTRAVIOLET SPECTROSCOPY: A LITERATURE SEARCH, by Frances Sachs. Nov. 29, 1952. Decl. Jan. 29, 1953. 38p. (AECD-3503; Y-920)

USAEC UNCLASSIFIED REPORTS

AECU-2395 2216
Argonne National Lab.
PROBLEMS IN THE CONSTRUCTION OF ANIMAL QUARTERS: a. IN SUBURBAN AND RURAL AREAS, by R. J. Flynn. Jan. 7, 1953. 22p. (AECU-2395; UAC-695)

AECU-2398 2270
Polytechnic Inst. of Brooklyn
FINAL REPORT ON A PROGRAM OF RESEARCH ON THE EFFECT OF ULTRAVIOLET LIGHT ON ENZYMES AND VIRUSES, by A. D. McLaren. 141p. (AECU-2398)

AECU-2401 2217
Presbyterian Hospital, Chicago
FACTORS CONTROLLING CHOLESTEROL SYNTHESIS IN THE BODY, by R. Gordon Gould. [nd] 25p. (AECU-2401)

AECU-2404 2255
[Massachusetts Inst. of Tech.]
CHEMISTRY OF THE FISSION ELEMENTS GROUP. [nd] 13p. (AECU-2404)

AECU-2416 2338
Institute for the Study of Rate Processes, Univ. of Utah
TECHNICAL REPORT NO. 5 [ON] INDUCTION OF CHEMICAL REACTIONS IN A HIGH FREQUENCY DISCHARGE. V. ION CLUSTERS, by Kenneth A. Wilde, Bruno J. Zwolinski, and Ransom B. Parlin. [nd] 17p. (AECU-2416; Tech. Report No. 5)

AECU-2418 2243
New York Univ. Postgraduate Coll. of Medicine
NEW HISTOLOGIC TECHNICS FOR AUTORADIOGRAPHY, by Victor H. Witten and Vera Holmstrom. New York Univ. Postgraduate Coll. of Medicine and New York Univ. Hospital. [nd] 12p. (AECU-2418)

AECU-2420 2218
Cancer Research Inst., New England Deaconess Hospital, Boston
STUDIES OF ADRENAL FUNCTION IN ALLOXAN-DIABETIC RABBITS WITH SPECIAL REFERENCE TO ADRENAL ASCORBIC ACID AND IN VITRO OXYGEN CONSUMPTION, by J. Sumner Wood, Jr. and Ralph W. McKee. Cancer Research Inst., New England Deaconess Hospital, Boston and Harvard Medical School. [nd] 19p. (AECU-2420)

AECU-2422 2360
Los Alamos Scientific Lab.
13 DIGIT FLOATING DECIMAL MODEL II C.P.C., by Dura Sweeney. [nd] 14p. (AECU-2422; LADC-1352)

AECU-2423 2347
Los Alamos Scientific Lab.
HIGH-SPEED TURBINE DRIVEN ROTATING MIRRORS, by Willard E. Buck. [nd] 16p. (AECU-2423; LADC-1317)

AECU-2424 2219
Wellcome Research Labs.
EFFECTS OF PURINE ANTAGONISTS ON A DIAMINOPURINE-RESISTANT LACTOBACILLUS CASEI, by Gertrude B. Elion, Samuel Singer, and George H. Hitchings, Wellcome Research Labs. and M. Earl Balis and George Bosworth Brown, Sloan-Kettering Inst. for Cancer Research. [nd] 15p. (AECU-2424)

AECU-2426 2245
Los Alamos Scientific Lab.
THE USE OF Ca EDTA IN CASES OF LEAD INTOXICATION, by Elston L. Belknap, Harry Foreman, Harriet L. Hardy, and Thomas L. Shipman. July 1952. 6p. (AECU-2426; LADC-1364)

AECU-2431 2348
Sloane Physics Lab., Yale Univ.
A MULTI-CHANNEL PULSE HEIGHT AND DELAY TIME RECORDER. William C. G. Ortel. Mar. 1, 1953. 20p. (AECU-2431; Technical Report No. 7)

ANL-4807 2437
Argonne National Lab.
CALCULATIONS ON U^{235} FISSION PRODUCT DECAY CHAINS, by I. L. Faller, T. S. Chapman, and J. M. West. May 1952. 267p. (ANL-4807)

BNL-209 2317
Brookhaven National Lab.
QUARTERLY PROGRESS REPORT FOR JULY 1–SEPTEMBER 30, 1952, UNCLASSIFIED SECTION. [Feb. 1953]. 42p. (BNL-209)

BNL-213 2410
Brookhaven National Lab.
NOTES ON THE HIGH ENERGY ACCELERATOR CONFERENCE [ON] DECEMBER 16-17, 1952, by M. Hildred Blewett. Jan. 1953. 32p. (BNL-213)

BNL-1290 2399
Brookhaven National Lab.
NEUTRON DEFICIENT ISOTOPES OF Hg, by K. Gopalakrishnan and A. de-Shalit, Palmer Physical Lab., Princeton Univ. and J. W. Mihelich, Brookhaven National Lab. [nd] 1p. (BNL-1290)

BNL-1355 2387
Brookhaven National Lab.
A NEUTRON DIFFRACTION STUDY OF MAGNESIUM FERRITE, by L. M. Corliss and J. M. Hastings, Brookhaven National Lab. and F. G. Brockman, Phillips Labs., Inc. [nd] 27p. (BNL-1355)

COO-97 2416
Illinois Univ.
PROGRESS REPORT NO. 3 [ON RADIATION DAMAGE AND RECOVERY], by J. S. Koehler. Feb. 1, 1953. 7p. (COO-97; Progress Report No. 3)

COO-150 2266
[Chicago Univ.]
PROGRESS REPORT [ON THE STRUCTURE AND PROPERTIES OF GRAPHITE]. [nd] 19p. (COO-150)

ISC-301 2318
Ames Lab.
QUARTERLY SUMMARY RESEARCH REPORT IN PHYSICS FOR JULY, AUGUST AND SEPTEMBER, 1952. Dec. 1, 1952. 24p. (ISC-301)

K-996 2349
Carbide and Carbon Chemicals Co. (K-25)
A DETECTOR FOR SODIUM VAPOR — A SURFACE IONIZATION SODIUM DETECTOR, by H. S. McKown. Issued Feb. 16, 1953. 12p. (K-996)

KAPL-ADM-701 2246
Knolls Atomic Power Lab.
A PARTIAL RÉSUMÉ OF THE USE AND TOXICITY OF MERCURY AND PREVENTION OF MERCURIALISM IN INDUSTRY WITH SPECIAL REFERENCE TO THE APPLICATION OF MERCURY IN THE SIR PROJECT, by Harold N. Hackett and Preston W. Reynolds. Jan. 25, 1952. 378p. (KAPL-ADM-701)

LA-1334 2345
Los Alamos Scientific Lab.
NOTE ON THE SHOCK COMPRESSION OF A γ-LAW GAS, by Foster Evans. Jan. 6, 1953. 14p. (LA-1334)

LA-1506 2383
Los Alamos Scientific Lab.
THEORY OF ALPHA-DECAY, by Joseph J. Devaney. Dec. 30, 1952. 29p. (LA-1506)

MTA-12 2296
California Research and Development Co., Livermore
DYNAMIC CORROSION OF STEEL BY LIQUID BISMUTH, by O. J. Elgert and C. J. Egan. Jan. 6, 1953. 21p. (MTA-12)

NAA-SR-212 2395
North American Aviation, Inc.
SOME THEORETICAL CONSIDERATIONS REGARDING THE PRODUCTION OF FISSIONABLE ISOTOPES IN A THERMAL REACTOR, by L. B. Robinson. Dec. 24, 1952. 16p. (NAA-SR-212)

NAA-SR-205 2267
North American Aviation, Inc.
THE RELAXATION TIME OF CONDUCTION ELECTRONS IN GRAPHITE, by J. S. Lomont. Oct. 20, 1952. 31p. (NAA-SR-205)

NYO-625 2272
Columbia Univ.
ANNUAL PROGRESS REPORT [ON] SEPARATION OF ISOTOPES BY CHEMICAL EXCHANGE IN THERMAL DIFFUSION COLUMNS, by William P. Senett, Russel W. Pierce, Fred Gollob, and T. I. Taylor. July 1, 1952. 56p. (NYO-625)

NYO-3099 2351
Columbia Univ.
QUARTERLY PROGRESS REPORT [ON] AN APPARATUS FOR THE DETERMINATION OF THE CRITICAL TEMPERATURE OF SODIUM, by W. A. Selke and M. M. Makansi. Oct. 1, 1952. 11p. (NYO-3099)

NYO-3357 2299
Pennsylvania State Coll., School of Mineral Industries
ANNUAL PROGRESS REPORT [ON] AN INVESTIGATION OF THE MINERALOGY AND PETROGRAPHY OF URANIUM-BEARING SHALES [FOR] JULY 1, 1951 TO APRIL 1, 1952, by C. E. Weaver, H. D. Wright, and T. F. Bates. Issued Mar. 28, 1952. 40p. (NYO-3357)

NYO-3413 2333
Puerto Rico Univ.
REPORT ON THE EAST-WEST ASYMMETRY EXPERIMENT OF THE ELECTRONIC COMPONENT OF THE COSMIC RADIATION. Issued Mar. 20, 1952. 19p. (NYO-3413)

NYO-3514 2263
New York Univ.
ANNUAL PROGRESS REPORT ON THE NATURE OF CRYSTAL GROWTH FROM SOLUTION, by John E. Vance and S. Z. Lewin. Aug. 1, 1952. 37p. (NYO-3514)

NYO-3712 2377
Rochester Univ.
THE ABSORPTION OF SLOW π^- MESONS IN α-PARTICLES, by A. G. Petschek. Feb. 6, 1953. 37p. (NYO-3712)

NYO-3960 2305
Columbia Univ. School of Mines
PROGRESS REPORT [ON] THE STUDY OF DIFFUSIONLESS PHASE CHANGES IN SOLID METALS AND ALLOYS [FOR] SEPTEMBER 1 TO NOVEMBER 30, 1952, by T. A. Read, M. W. Burkart, C. W. Chen, M. Wechsler, and D. S. Lieberman. [nd] 5p. (NYO-3960)

NYO-4503 2300
New York Operations Office, AEC
A DRILL HOLE SCINTILLATION LOGGING UNIT, TYPE TU-5-A, by H. J. DiGiovanni, R. T. Graveson, and A. H. Yoli. Dec. 3, 1952. 24p. (NYO-4503)

ORNL-1323 2306
Oak Ridge National Lab.
EFFECT OF NEUTRON IRRADIATION ON SUPERSATURATED SOLID SOLUTION OF BERYLLIUM IN COPPER, by G. T. Murray and W. E. Taylor. Issued Feb. 13, 1953. 29p. (ORNL-1323)

ORNL-1411 2239
Oak Ridge National Lab.
PERSONNEL MONITORING OPERATING TECHNIQUES, by H. R. Craft, J. C. Ledbetter, and J. C. Hart. Oct. 1, 1952. 124p. (ORNL-1411)

ORNL-1414 2425
Oak Ridge National Lab.
SUMMARY REPORT ON PORTLAND CEMENT CONCRETES

FOR SHIELDING, by R. B. Gallaher and A. S. Kitzes. Issued Mar. 2, 1953. 30p. (ORNL-1414)

ORNL-1459 2422
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TABLES FOR THE ANALYSIS OF ALLOWED AND FORBIDDEN BETA TRANSITIONS, by M. E. Rose, C. L. Perry, and Nancy M. Dismuke. Issued Feb. 11, 1953. 376p. (ORNL-1459)

ORNL-1461 2307
Oak Ridge National Lab.
A SIMPLE ELECTROMAGNETIC FLOWMETER FOR LIQUID METALS, by R. M. Carroll. Issued Mar. 4, 1953. 19p. (ORNL-1461)

ORNL-1473 2358
Oak Ridge National Lab.
HIGH TEMPERATURE MASS SPECTROMETER OVEN, by J. R. Walton. Jan. 8, 1953. 11p. (ORNL-1473)

ORO-87 2268
North Carolina State Coll.
PROGRESS REPORT NO. 4 [ON] THE MEASUREMENT OF THERMAL PROPERTIES OF NON-METALLIC MATERIALS AT HIGH TEMPERATURES, COVERING PERIOD ENDING DECEMBER 31, 1952, by E. B. Finch and K. O. Beatty, Jr. Jan. 29, 1953. 14p. (ORO-87; Progress Report No. 4)

SEP-120 2308
Sylvania Electric Products, Inc., Atomic Energy Div.
POWDER METALLURGY IN EUROPE; A TRIP REPORT, by Henry H. Hausner. Issued Dec. 31, 1952. 47p. (SEP-120)

TID-5130 2273*
[Pittsburgh Univ.]
REPORT ON VISIT OF HENRY FREISER TO THE ATOMIC ENERGY RESEARCH ESTABLISHMENT AT HARWELL, ENGLAND, ON SEPTEMBER 10, 1952, by Henry Freiser. [nd] 2p. (TID-5130; AEC-43/552)

UCRL-2045 2225
Radiation Lab., Univ. of Calif., Berkeley
MATHEMATICAL THEORY OF THE LETHAL ACTION OF RADIATION ON YEAST CELLS, by Robert Arthur Wijsman. Dec. 11, 1952. 42p. (UCRL-2045)

UCRL-2076 2364
Radiation Lab., Univ. of Calif., Berkeley
THE USE OF THE NUCLEOMETER SCALER AND THE FOUR PI CHAMBER TO MEASURE ELECTRON CAPTURE RADIATIONS, by D. C. Conway and J. O. Rasmussen. Jan. 7, 1953. 7p. (UCRL-2076)

UCRL-2077 2340
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ON THE RADIATION OF A HIGH ENERGY ELECTRON IN A CONSTANT MAGNETIC FIELD, by Maurice Neuman. Jan. 9, 1953. 28p. (UCRL-2077)

UCRL-2080 2323
Radiation Lab., Univ. of Calif., Berkeley
SUMMARY OF RESEARCH PROGRESS MEETING OF DECEMBER 4, 1952, by Sergey Shewchuck. Jan. 14, 1953. 5p. (UCRL-2080)

UCRL-2084 2336
Radiation Lab., Univ. of Calif., Berkeley
THE CRYSTAL STRUCTURE OF AMMONIUM OXIDE, by W. J. Siemons and D. H. Templeton. Jan. 19, 1953. 32p. (UCRL-2084)

UR-212 2220
Atomic Energy Project, Univ. of Rochester
INDEX OF REPORTS AND PUBLICATIONS BY THE UNIVERSITY OF ROCHESTER ATOMIC ENERGY PROJECT, by Eleanor B. Jones. Dec. 8, 1952. 132p. (UR-212)

UR-226 2324
Atomic Energy Project, Univ. of Rochester
STUDIES OF FLASH BURNS: THE CARBON ARC SOURCE, by Thomas P. Davis, Leo J. Krolak, and Robert M. Blakney. Nov. 28, 1952. 32p. (UR-226)

Y-F10-69 2397
Oak Ridge National Lab., Y-12 Area
NUMERICAL INTEGRATION OF DIFFERENTIAL EQUATIONS: MULTI-POINT BOUNDARY PROBLEMS, by R. R. Coveyou. Aug. 20, 1951. 4p. (Y-F10-69)

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AERE-EL/R-1065 2316
Atomic Energy Research Establishment, Harwell, Berks (England)

CRP-527 2382
Chalk River Project (Canada)
CROSS SECTION MEASUREMENTS OF REACTIONS INDUCED BY NEUTRONS OF 14.5 MEV. ENERGY, by E. B. Paul and R. L. Clarke. [nd] 27p. (CRP-527)

DC-52-25-66 2303
Babcock and Wilcox Co.
INVESTIGATION OF LARGE SCALE DYNAMIC LIQUID LITHIUM CORROSION APPARATUS; TECHNICAL REPORT IV, by A. W. Dana, Jr., O. H. Baker, and M. Ferguson. Apr. 30, 1952. 51p. (DC-52-25-66; [B&W]-5229; Tech. Report No. IV)

DC-52-27-45 2295
Babcock and Wilcox Co.
INVESTIGATION OF METAL TRANSPORT BY LIQUID LITHIUM, by A. W. Dana, Jr., O. H. Baker, and M. Ferguson. May 15, 1952. 94p. (DC-52-27-45; [B and W]-5230; Tech. Report No. 5)

NBS-2155 2427
National Bureau of Standards
PROPERTIES OF FLUORINE COMPOUNDS: THE VIBRATIONAL SPECTRUM OF CHLOROTRIFLUOROETHYLENE, by D. E. Mann, National Bureau of Standards and N. Acquista and Earle K. Plyler, Atomic Physics Lab., National Bureau of Standards. Jan. 15, 1953. 18p. (NBS-2155)

NP-4282 2304
Metals Research Lab., Case Inst. of Tech.
AN INVESTIGATION OF THE MECHANICAL PROPERTIES OF TITANIUM BASE ALLOYS TO DETERMINE THE KINETICS OF THE PHASE TRANSFORMATION AND RESULTING MICROSTRUCTURES: SUMMARY REPORT FOR CONTRACT PERIOD MAY 18, 1951 TO JULY 31, 1952, by F. R. Brotzen, E. L. Harmon, and A. R. Troiano. Sept. 30, 1952. 83p. (NP-4282; U-25794)

NP-4287 2319
Wisconsin Univ.
A CONFERENCE ON THE APPLICATIONS OF X-RAY SPECTROSCOPY TO SOLID STATE PROBLEMS [HELD] 23-25 OCTOBER 1950. [nd] 81p. (NP-4287; NAVEXOS P-1033)

NP-4301 2361
Electrona Corp.
DEVELOPMENT OF RADIACMETER IM-79( )/PD; THIRD QUARTERLY PROGRESS REPORT [FOR] AUGUST 15, 1952 TO NOVEMBER 15, 1952, by Carl Bosch. [nd] 46p. (NP-4301)

NP-4309 2280
Stanford Univ.
TECHNICAL REPORT NO. 14 [ON] BASIC HEAT TRANSFER AND FLOW FRICTION DESIGN DATA FOR GAS FLOW IN CIRCULAR AND RECTANGULAR CYLINDRICAL TUBE HEAT EXCHANGERS, by W. M. Kays. June 15, 1951. 41p. (NP-4309; Technical Report No. 14; U-18044)

NP-4312 2320
Columbia Radiation Lab., Columbia Univ.
PROGRESS REPORT; THIRD QUARTERLY REPORT FOR THE YEAR 1952. Sept. 30, 1952. 18p. (NP-4312; U-25161)

NP-4332 2429
Solid-State and Molecular Theory Group, Mass. Inst. of Tech.
QUARTERLY PROGRESS REPORT NO. 7. Jan. 15, 1953. 56p. (NP-4332; Quarterly Progress Report No. 7; U-26128)

NP-4335 2256
University of Southern Calif.
THE MECHANISM OF EXCHANGE OF HYDROGEN GAS AND AQUEOUS ALKALI, by W. K. Wilmarth, June C. Dayton, and J. M. Flournoy. [nd] 20p. (NP-4335; U-23786)

NP-4336 2257
University of Southern Calif.
THE CONVERSION OF ORTHO-PARAHYDROGEN BY CUPROUS ACETATE IN QUINOLINE, by W. K. Wilmarth and Max K. Barsh. [nd] 24p. (NP-4336)

NP-4339 2258
University of Southern Calif.
THE MECHANISM OF THE EXCHANGE OF HYDROGEN GAS WITH SOLUTIONS OF POTASSIUM AMIDE IN LIQUID AMMONIA, by W. K. Wilmarth and June C. Dayton. [nd] 19p. (NP-4339; U-23788)

NP-4349 2350
Cryogenic Lab., Ohio State Univ.
TECHNICAL REPORT NO. 16 [ON] AN R-F ENERGY REGULATOR USED TO CONTROL HIGH TEMPERATURES IN THERMODYNAMIC MEASUREMENTS, by Loren E. Bollinger, Rudolph Speiser, and Herrick L. Johnston. Dec. 15, 1952. 28p. (NP-4349; Tech. Report No. 16; TR-281-16; U-26226)

NP-4356 2321
Cryogenic Lab., Ohio State Univ.
TECHNICAL REPORT NO. 15 ON VAPOR PRESSURE OF INORGANIC SUBSTANCES. XI. GALLIUM, by Rudolph Speiser and Herrick L. Johnston. Dec. 4, 1952. 12p. (NP-4356; Tech. Report No. 15; TR-281-15)

NP-4368 2388
Research Lab. of Electronics, Mass. Inst. of Tech.
TECHNICAL REPORT NO. 224 [ON] THE NUCLEAR MAGNETIC MOMENT OF S^{33} FROM MICROWAVE SPECTROSCOPY, by J. R. Eshbach, R. E. Hillger, and M. W. P. Strandberg. Dec. 20, 1951. 19p. (NP-4368; Tech. Report No. 224; U-24932)

NP-4381 2332
Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro (Brazil)
ON THE SPREAD OF THE SOFT COMPONENT OF COSMIC RADIATION, by G. Molière. Dec. 20, 1952. 6p. (NP-4381; Physics Note No. 8)

NP-4389 2281
Alfred Univ.
HIGH TEMPERATURE THERMAL DIFFUSIVITY FURNACES AND TECHNIQUES FOR MEASUREMENT, by W. B. Crandall and G. E. Potter. Jan. 1, 1953. 18p. (NP-4389)

NP-4397 2322
High Voltage Research Lab., Mass. Inst. of Tech.
INTERIM REPORT [ON] THE PHYSICAL AND RADIOGRAPHIC PROPERTIES OF X-RAYS IN THE 2 TO 6 MILLION VOLT RANGE, by John G. Trump. Jan. 15, 1953. 12p. (NP-4397)

NP-4398 2224
School of Aviation Medicine
THE ANTIBODY RESPONSE OF ANIMALS EXPOSED TO X-RADIATION: THE LEVELS OF X-RADIATION EXPOSURE REQUIRED TO DESTROY THE ABILITY TO RESPOND TO SALMONELLA TYPHIMURIUM ANTIGEN , by John D. Fulton and Roland B. Mitchell. Feb. 1953. 8p. (NP-4398; Report No. 1)

NP-4402 2362
Joint Establishment for Nuclear Energy Research (Norway)
SLOW NEUTRON SCINTILLATION DETECTOR, by A. Lundby, K. Skarsvåg, and E. Andersen. Nov. 6, 1952. 8p. (NP-4402; Jener Report No. 13)

NP-4403 2396
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PHOTO-NEUTRONS IN HEAVY WATER FROM URANIUM FISSION PRODUCTS, by N. Holt and A. Lundby. [nd] 6p. (NP-4403; Jener Report No. 11)

TOI-52-8 2363
Technical Operations, Inc.
RESEARCH STUDY LEADING TO THE USE OF TRANSISTORS IN RADIAC SURVEY METERS; QUARTERLY PROGRESS REPORT NO. 2, [FOR] OCTOBER 1, 1952 THROUGH DECEMBER 31, 1952, by A. R. Pearlman and R. R. Smyth. [nd] 27p. (TOI-52-8; Progress Report No. 2)

USNRDL-375 2226
Naval Radiological Defense Lab.
EFFECT OF 2,000 ROENTGENS LOCAL X IRRADIATION ON THE GROWTH AND METABOLISM OF RAT BONE, by S. H. Cohn and J. K. Gong. Oct. 16, 1952. 35p. (USNRDL-375)

USNRDL-381 2227
Naval Radiological Defense Lab.
EFFECTS OF 500 ROENTGEN WHOLE-BODY X IRRADIATION ON THE GROWTH AND METABOLISM OF RAT BONE, by S. H. Cohn and J. K. Gong. Nov. 25, 1952. 21p. (USNRDL-381)

USNRDL-382 2261
Naval Radiological Defense Lab.
DUST SAMPLING BY THERMAL PRECIPITATION, by I. G. Poppoff. Dec. 8, 1952. 18p. (USNRDL-382)

NUCLEAR SCIENCE ABSTRACTS

Vol. 7 April 30, 1953 No. 8

BIOLOGY AND MEDICINE

2216
Argonne National Lab.
PROBLEMS IN THE CONSTRUCTION OF ANIMAL QUARTERS: a. IN SUBURBAN AND RURAL AREAS, by R. J. Flynn. Jan. 7, 1953. 22p. (AECU-2395; UAC-695)

Some of the questions are listed that must be answered before any planning for the establishment and maintenance of animal quarters can be initiated. As examples of animal quarters for a rural or suburban area, the design and operation of two animal-quarters buildings located at Argonne National Laboratory are described. (L.T.W.)

2217
Presbyterian Hospital, Chicago
FACTORS CONTROLLING CHOLESTEROL SYNTHESIS IN THE BODY, by R. Gordon Gould. [nd] 25p. (AECU-2401)

Two dogs, one sham-operated and the other hepatectomized, were injected intravenously with labeled Na acetate, and the specific activities of the plasma, liver, bile, intestine, and skin in counts/min/mg of cholesterol were determined. Extrahepatic synthesis of cholesterol occurred in hepatectomized dogs, particularly in intestine and kidney, but did not occur in the bloodstream. The rate of appearance of isotope in the whole-blood cholesterol of normal dogs given oral-labeled Na acetate is shown. Radioactive C atoms appear first in plasma-free cholesterol, next in red-cell cholesterol, and more slowly in plasma-esterified fraction. Dog red cells containing labeled cholesterol molecules were suspended in normal dog plasma and incubated at 37°C. Under these in vitro conditions the molecules move from red cells to plasma by an interchange process, no change occurring in cholesterol concentration. The movement of labeled cholesterol molecules from plasma to liver was observed. The rate at which blood cholesterol appears in other tissues and organs was studied. The synthesis of cholesterol in the liver is affected by the presence of cholesterol in the diet. The rate of appearance and disappearance of dietary cholesterol in blood plasma is shown. It was demonstrated that dogs are able to substitute dietary cholesterol for endogeneous, providing the intake is not too high. The synthesis and dynamics of cholesterol in the normal subject are summarized. (L.T.W.)

2218
Cancer Research Inst., New England Deaconess Hospital, Boston
STUDIES OF ADRENAL FUNCTION IN ALLOXAN-DIABETIC RABBITS WITH SPECIAL REFERENCE TO ADRENAL ASCORBIC ACID AND IN VITRO OXYGEN CONSUMPTION, by J. Sumner Wood, Jr. and Ralph W. McKee. Cancer Research Inst., New England Deaconess Hospital, Boston and Harvard Medical School. [nd] 19p. (AECU-2420)

In the present experiments, we have studied, in 15 control and 10 alloxan-diabetic rabbits, the blood glucose, muscle and liver glycogen, and adrenal ascorbic acid, respiration, and dry weight. In the uncomplicated (non-acidotic), unfasted diabetic state the blood glucose was markedly elevated, and the liver glycogens were within normal limits. The morphological picture of the adrenal cortex was found to be within normal limits, from gross and microscopic studies. The biochemical analysis of ascorbic acid and in vitro oxygen utilization showed the adrenals to be unaltered in the non-stressed diabetic state. (auth)

2219
Wellcome Research Labs.
EFFECTS OF PURINE ANTAGONISTS ON A DIAMINOPURINE-RESISTANT LACTOBACILLUS CASEI, by Gertrude B. Elion, Samuel Singer, and George H. Hitchings, Wellcome Research Labs. and M. Earl Balis and Georgè Bosworth Brown, Sloan-Kettering Inst. for Cancer Research. [nd] 15p. (AECU-2424)

A strain of Lactobacillus casei which is resistant to the inhibitory effects of 2,6-diaminopurine is not inhibited by two other compounds, purine and 8-azaadenine, which are also regarded as primarily "antiadenines." Moreover, in contrast to the results with the wild strain, the effects of a number of other antagonists are not blocked by adenine in the mutant. Growth and incorporation studies had previously shown the resistant organism to have a diminished ability to incorporate adenine and diaminopurine. The present studies provide additional observations which are consistent with the view that this diminution in the incorporation of both adenine and its antagonists is the major alteration in metabolism which confers resistance. The inhibition studies also reveal a number of minor differences in the response of the wild and mutant strains to inhibitors. These may reflect adjustments, consequential to the major change, in the equilibria of other metabolic pathways which involve purine derivatives. (auth)

2220
Atomic Energy Project, Univ. of Rochester
INDEX OF REPORTS AND PUBLICATIONS BY THE UNIVERSITY OF ROCHESTER ATOMIC ENERGY PROJECT, by Eleanor B. Jones. Dec. 8, 1952. 132p. (UR-212)

This index covers declassified and unclassified work of the University of Rochester Atomic Energy Project from its beginning in 1943 until the end of 1952. It contains titles of the work described in Manhattan District and AEC reports as well as material published in books and journals. The material is indexed by subject, progress reports, books, authors, and report numbers. (L.T.W.)

2221
SOME DIAGNOSTIC AND THERAPEUTIC APPLICATIONS OF RADIOACTIVE IODINE. Kurt Philipp and Fritz Ruf. Strahlentherapie 89, 118-27(1952).

Clinical examples of the use of I^{131} in thyroid disorders and in the routinely employed resorption method for examining blood-flow disturbances in the extremities, as after fractures, late injuries by thrombosis, etc., are presented. (G.Y.)

2222
EXPERIMENTS ON THE MECHANISM OF ACTION OF TETRA-SODIUM 2-METHYL-1:4-NAPHTHOHYDROQUINONE DIPHOSPHATE AS A MITOTIC INHIBITOR AND RADIOSENSITISER, USING THE TECHNIQUE OF TISSUE CULTURE. EXPERIMENTAL METHODS AND

QUANTITATIVE RESULTS. J. S. Mitchell and I. Simon-Reuss. Brit. J. Cancer 6, 305-16(1952) Sept.

More satisfactory quantitative experimental methods using the technique of tissue culture have been developed to study mitotic inhibition and radiosensitization by chemical agents, using tetrasodium 2-methyl-1:4-naphthohydroquinone diphosphate (Compound I) as the reference substance. The best estimate of the antimitotic activity of the compound is the concentration which produces 50% mitotic inhibition under the experimental conditions. Studies of cytological effects are even more important than those of mitotic inhibition. Cell migration has been shown to be unimportant in these experiments. For Compound I, there is no indication of departure from a linear relation between the mitotic inhibition in probits and the logarithm of the concentration. For 50% mitotic inhibition after 24 hr, the concentration is $3.81 \pm 0.15 \times 10^{-6}$M. For x radiation there is no indication of departure from a linear relation between mitotic inhibition in probits and the logarithm of the dose. The study of the combination of the action of x radiation and Compound I by means of the summation method has demonstrated potentiation of both mitotic inhibition and chromosome fragmentation. Thermal instability of Compound I in aqueous solution in the absence of oxygen has been demonstrated. There is almost complete inactivation after incubation at 39°C for 7 days. This finding may account for some erratic results in animal experiments and clinical trials. (auth)

2223

A NEW MICROTOME FOR THIN-SECTIONING FOR ELECTRON MICROSCOPY. Michael L. Watson. Biochim. et Biophys. Acta 10, 1-4(1953) Jan.

A new microtome is described for the cutting of thin sections for the electron microscope. The specimen is mounted on an arm attached to a constantly rotating shaft. The advance mechanism for the knife consists of a stiff member supporting the knife which is bent by stretching a relatively flexible spring attached to it. Very reproducible motion is claimed. Ribbons with a thickness of less than 300 A have been obtained. (auth)

RADIATION EFFECTS

2224

School of Aviation Medicine

THE ANTIBODY RESPONSE OF ANIMALS EXPOSED TO X-RADIATION: THE LEVELS OF X-RADIATION EXPOSURE REQUIRED TO DESTROY THE ABILITY TO RESPOND TO SALMONELLA TYPHIMURIUM ANTIGEN , by John D. Fulton and Roland B. Mitchell. Feb. 1953. 8p. (NP-4398; Report No. 1)

To determine what level of whole-body x radiation would destroy an animal's ability to respond to an antigen, a factorially designed experiment was performed in which groups of male albino mice received combinations of various levels of whole-body x radiation, immunization, and infection. Under the conditions of the experiment it was determined that 300 r of whole-body x radiation exposure completely destroyed the animal's ability to respond to the immunizing antigen. (auth)

2225

Radiation Lab., Univ. of Calif., Berkeley

MATHEMATICAL THEORY OF THE LETHAL ACTION OF RADIATION ON YEAST CELLS, by Robert Arthur Wijsman. Dec. 11, 1952. 42p. (UCRL-2045)

The main part of this thesis is devoted to the derivation and study of formulas for the probability of survival of the haploid and diploid yeast cell, based on models proposed by Zirkle and Tobias. Some properties of so-called completely monotonic functions are developed, and the results are applied to the investigation of some of the more complicated formulas. Finally the theoretical expressions are compared with the experimental data obtained by Tobias. If the "sensitive sites" can be identified with the genes, and if the number of vital gene pairs in the diploid cell is n, then the comparison between theory and experiment leads to the conclusion that (1) n is between 2 and 30, and (2) at least some of the genes in the diploid cell must be close together. Furthermore, some of the data suggest that homologous chromosomes are paired, so that homologous genes are close together. It is emphasized that more data are necessary to make better conclusions, and that a more complete theory is necessary to explain better the response of yeast cells to radiation. (auth)

2226

Naval Radiological Defense Lab.

EFFECT OF 2,000 ROENTGENS LOCAL X IRRADIATION ON THE GROWTH AND METABOLISM OF RAT BONE, by S. H. Cohn and J. K. Gong. Oct. 16, 1952. 35p. (USNRDL-375)

This investigation provides an extension of the understanding of the effects of ionizing radiation on bone growth in terms of the depression of calcium metabolism and of the alkaline phosphatase activity. The local effects of x radiation were observed by comparing the inorganic weight, organic weight, length, bone ash percentage, Ca^{45} uptake and alkaline phosphatase level of the irradiated tibia with the corresponding measurements of the nonirradiated homologous tibia. The quantitative aspects of the retardation in osteogenesis following a massive dose of radiation were studied. Data suggesting that bone alkaline phosphatase is involved in the elaboration of the organic matrix of bone are presented. Further, a mechanism to explain the depressing action of radiation on the growth and metabolism of bone in terms of the depression of the cellular production of bone alkaline phosphatase is proposed. (auth)

2227

Naval Radiological Defense Lab.

EFFECTS OF 500 ROENTGEN WHOLE-BODY X IRRADIATION ON THE GROWTH AND METABOLISM OF RAT BONE, by S. H. Cohn and J. K. Gong. Nov. 25, 1952. 21p. (USNRDL-381)

The response of rats to 500 r whole-body irradiation was studied in terms of bone growth, body growth, and tibia and serum alkaline phosphatase levels. The irradiated animals exhibit a temporary depression in bone growth as determined by measurements of tibia length, ash weight, and matrix weight made during a period of 30 days following 500 r x irradiation. Bone length was found to be correlated with body weight, both in young growing animals and in the same animals after irradiation. The constancy of this relationship suggests that the depressing action of whole-body x irradiation on the bone is non-specific. The responses of animals to 500 r whole-body irradiation and to 2000 r local bone irradiation were compared. Depression of tibia and serum alkaline phosphatase occurs after whole-body irradiation. The effects observed were similar to the response to the higher dose of local irradiation but less marked. (auth)

2228

IRRADIATION EFFECTS OF ROENTGEN THERAPY ON THE GROWING SPINE. F. B. D. Neuhauser, M. H. Wittenborg, C. Z. Berman, and J. Cohen. Radiology 59, 637-50(1952) Nov.

Thirty-four children who had received irradiation in which the spine was included in the field of therapy were restudied at intervals ranging from 2 to 13 yr following treatment. Growth disturbances are described which appear to be directly related to dosage and inversely related to age. Precautions to be used during x-ray therapy of the growing spine are suggested. (C.H.)

2229
EFFECTS OF EXTREME HEAT AND COLD ON HUMAN SKIN. III. NUMERICAL ANALYSIS AND PILOT EXPERIMENTS ON PENETRATING FLASH RADIATION EFFECTS. Konrad Buettner. J. Applied Physiol. 5, 207-220(1952) Nov.

An attempt was made to predict the degree of tissue necrosis to be expected in the skins of white and negro man following penetrating radiant heat application of the order of 0–8 cal/cm.^{2} The prerequisites for these calculations are: the reaction rate data of protein denaturation; absorption of radiation in the skin; and the heat conductivity of different skin layers. These values were selected critically from the literature. A numerical solution of the differential equation of heat conductivity yielded temperature data during the irradiation phase and the subsequent dissipation phase. These temperature data were used to compute the radiation dose necessary to produce necrosis at a certain skin depth. These data are in agreement with experiments described in literature. Cooling of the skin after heat application appears to afford some protection. Pilot experiments show that heavily pigmented skin exhibits an explosive reaction to high intensity visible light, whereas white (European) skin exposed to the same intensity does not undergo immediate structural changes, excluding protein denaturation. (auth)

2230
STUDIES ON THE EFFECTS ON THE OVARIAN FOLLICLES IN THE MOUSE OF INTERNAL IRRADIATION WITH P^{32} WITH SPECIAL REFERENCE TO THE QUANTITATIVE EVALUATION. Erik Odeblad. Acta Radiol. 38, 375-81(1952) Nov.

The ovaries of mice in various cyclic phases, of mice injected with P^{32} at different points of time before death, and of mice given different amounts of P^{32} were studied as regards the possibility of obtaining quantitative methods of studying the irradiation effects on the follicles. The general appearance of the follicles in histological sections, the autoradiographs, the occurrence of nuclear fragmentation, pyknosis and cytoplasmic vacuolization as well as the inhibition of mitoses cannot for various reasons be used for quantitative evaluation. The counting of "blown-up" (ballooned) cells and the measurement of apparent follicular diameters seem to permit quantitative studies on the early irradiation effects on the ovarian follicles. (auth)

2231
THE EFFECT OF X-RAY IRRADIATION OF THE PITUITARY ON THE SEXUAL SYSTEM OF THF RAT. Axel Westman. Acta Obstet. Gynecol. Scand. 32, 108-19(1953).

The pituitary of infantile, adult, and pregnant rats was irradiated. There was no evidence that radiological treatment of the pituitary of infantile rats has a stimulatory effect on the function of the gland with sexual precocity as a result. A dose of 2000 r had harmful effects on the pituitary in some of the adult rats used. In all cases in which 6000 r were administered to the pituitary, the animal died shortly after treatment. Four generations of the animals treated during pregnancy were followed up. Sexual maturity occurred within normal limits of time in all these animals. In none of them was there any evidence of a disturbance of the sexual system. This applied also to the progenies of animals which had tolerated a dose of 2000 r to the pituitary during pregnancy. (auth)

2232
INDIRECT RADIATION EFFECT AND DOSE-TIME DISTRIBUTION. W. Dittrich. Z. Naturforsch. b8, 10-13(1953) Jan. (In German)

In the aqueous phase, the extent of the indirect effect of ionizing radiations is strongly affected by the dose-time distribution, provided the recombination of free H atoms and OH radicals into H_2O proceeds in close concurrence with the radiochemical primary reaction. In this sense, the observations of Brasch et al. (NSA 7-1395), made on dissociation of tartrazine molecules by high-energy electron bursts from a capacitron, that the ion yield increases with the number of bursts for a given total dose, is conceived of as a recombination effect. Radiation-biological effects are generally affected to a significant degree by changes in the dose-time distribution only for doses over 10^4 rep. (tr-auth)

2233
PULMONARY LESIONS FOLLOWING PENETRATING IRRADIATIONS OF THE THORAX. Gaetano Melillo. Radiol. med. 38, 1067-72(1952) Nov. (In Italian)

The author, having observed 19 cases of lung injuries following x irradiations for breast cancer, discusses their frequency, conditions for initiation, and pathology. The different radiological aspects of the lesions are illustrated in discussing the diagnostic differences between these and tuberculosis or metastases of cancer. (tr-auth)

2234
RADIATION INJURY FROM RADIOACTIVE PHOSPHORUS IN TRACER EXPERIMENTS WITH PLANTS. K. Strzemienski. New Zealand J. Sci. Technol. A34, 313-19(1952) Dec.

An experiment was made with short-rotation ryegrass grown in pots with four levels of P^{32} radioactivity, viz. 40, 160, 640, and 2560 μc per gram of phosphorus. No significant differences were found in either dry-matter production or phosphate absorption and distribution. These results and those of other workers are discussed. (auth)

2235
EFFECT OF X-RAYS ON THE INCORPORATION OF ^{14}C INTO TISSUE FRACTIONS OF THE MOUSE. G. Hevesy and Gudrun Dreyfus. Arkiv Kemi 4, 337-61(1952).

Following intraperitoneal injection of acetate labeled with C^{14} in the carboxyl group total irradiation of 250 fed mice with 880 r administered in the course of 3 minutes leads to an increase in the mean value of C^{14} incorporation into total tissue of liver, intestinal mucosa, muscles, kidney, lungs, brain, and plasma, into total fats of liver, muscles, kidney, and brain, and into the proteins of liver, kidney, and brain of the mice investigated. Due to the large mean deviations, the observed increase is significant to some extent only ($P = <0.03; <0.005; <0.05; <0.04$ resp. <0.03) for the three brain fractions, the liver proteins, and the plasma tissue. (auth)

2236
THE INFLUENCE OF IONIZING RADIATION ON MITOTIC ACTIVITY IN THE RAT'S CORNEAL EPITHELIUM. J. S. Friedenwald and Sylvia Sigelman. Exptl. Cell. Research 4, 1-31(1953) Feb.

The study of mitotic inhibition in the rat's corneal epithelium by x radiation indicates that the inhibition of mitosis by ionizing radiation results from the production in the tissue of reactive chemical substances and is markedly influenced by the conditions of the experiment. Mitosis is inhibited through the destruction of some substance of which the cells require a specific quantity in order to be ready for mitosis, and which the cell manufactures at an exponentially steady rate during interphase. It is estimated that the corneal epithelial cells of the rat require between 40 and 140 units of this critical material in order to be ready for mitosis. (auth)

2237
NUCLEAR CHANGES IN RESPONSE TO CONTINUOUS IRRADIATION. M. S. Burstone. Arch. Path. 55, 55-62(1953) Jan.

Continuous local irradiation of the epithelium of the tongue with dosages producing a minimal tissue necrosis results in the formation of large atypical nuclei containing masses of chromatin which stain with the Feulgen method and with

methyl green. Treatment of irradiated and normal sections with desoxyribonuclease prior to staining results in a marked diminution in stainability of irradiated nuclei as contrasted with normal nuclei. It is postulated that continuous irradiation results in the formation of nucleic acid complexes in a less-aggregated state than normal. (auth)

2238

THE INFLUENCE OF X-IRRADIATION AND ATABRINE UPON FEATHERING IN THE CHICK. Carl D. Douglass, Paul L. Day, Barbara Kelley, and I. Meschan. Science 117, 274(1953) Mar. 13.

In a study designed to investigate modifications of the x-irradiation-induced leukopenia in the chick, it has been observed that feathering is inhibited by irradiation and that this inhibition is overcome by adding Atabrine to the diet. (G.Y.)

RADIATION HAZARDS AND PROTECTION

2239

Oak Ridge National Lab.

PERSONNEL MONITORING OPERATING TECHNIQUES, by H. R. Craft, J. C. Ledbetter, and J. C. Hart. Oct. 1, 1952. 124p. (ORNL-1411)

The work of external monitoring including procedures for the distribution, collection, and processing of film-badge and pocket meters is reported. The operating techniques were devised to provide accurate records of personnel exposures. The primary purpose of the procedures was to standardize techniques and to assist in the instruction of new employees. (J.E.D.)

2240

EFFECT OF EXPOSURE TO COLD ON RESPONSE OF THE RAT TO WHOLE BODY RADIATION. J. C. Barlow and E. A. Sellers. Am. J. Physiol. 172, 148-51(1953) Jan.

Experiments dealing with the interrelations between long term exposure to cold and total-body radiation have been described. Acclimatization to cold did not decrease the resistance of Wistar rats to whole-body radiation. When rats of equal weight were irradiated, acclimatization to cold increased survivals, but when the influence of cold on the age-weight relationship was taken into account it was found to have neither a beneficial nor an adverse effect upon survival. Exposure to cold after radiation increased the mortality rate. (auth)

2241

THE PROTECTIVE EFFECT AGAINST X-IRRADIATION OF METHYL LINOLEATE IN THE RAT. Harry J. Deuel, Jr., Amber L. S. Cheng, George D. Kryder, and M. E. Bingemann. Science 117, 254-5(1953) Mar. 6.

Male and female rats 5 to 6 months old were placed on a fat-depletion diet and after depletion were continued on a fat-free diet for 8 weeks. At the end of this time a group of the animals were given 10 mg of methyl linoleate daily by mouth. All rats were subjected to 300 r of x radiation weekly for 4 weeks, after which the same dose was given once in 3 weeks or on alternate weeks until a 2400-r exposure had been completed over a 14-week period. Increased survival time for the linoleate-supplemented rats was noted, for which the reason is discussed. (G.Y.)

2242

URANIUM MINING AND MILLING; A CURRENT STUDY. Henry N. Doyle. Occup. Health 13, No. 3, 37,46(1953) Mar.

The health hazards associated with the mining and milling of U ores in the Colorado Plateau are discussed. The study has indicated that the greatest potential radiation hazard comes from Rn and two of its daughters, RaA and RaC', since all of them emit energetic α particles injurious to body cells. A value of 100 $\mu\mu c$ of RaA and RaC' per liter of air has been suggested as a working level. The medical and clinical lab. examinations of 1100 workers, which was begun in 1950, so far indicate no clear-cut etiologic or pathologic patterns. It is emphasized, however, that the workers should be examined periodically and that sufficient information has been derived to conclude that certain conditions exist, which if not corrected, may affect the workers health. (L.M.T.)

RADIOGRAPHY

2243

New York Univ. Postgraduate Coll. of Medicine

NEW HISTOLOGIC TECHNICS FOR AUTORADIOGRAPHY, by Victor H. Witten and Vera Holmstrom. New York Univ. Postgraduate Coll. of Medicine and New York Univ. Hospital, [nd] 12p. (AECU-2418)

Several difficulties were encountered in a study intended to localize by autoradiography the radioactive isotope Ra^{224} applied to human skin in vivo. In order to overcome some of the major difficulties it was necessary to apply methods capable of processing the tissue sections without displacing the water soluble radioisotope and techniques for the satisfactory staining of autoradiograms prepared by directly mounting the tissue sections on nuclear track emulsion. The advantages of the Adamstone and Taylor technique for cutting frozen sections to be used for autoradiography are discussed. A special gearing mechanism for a sliding microtome which was designed to facilitate this technique is described. Previously described techniques which may be used for staining tissue sections mounted directly on photographic emulsion are reviewed and a new stain designed to meet the requirements of this particular study is given in detail. The staining characteristics of these techniques are compared with each other and with those of the new stain. (auth)

RADIOTHERAPY

2244

ROENTGEN THERAPY DOSE COMPUTING DEVICE, ESPECIALLY FOR ROTATION THERAPY WITH HIGH ENERGY (2 MEV.) W. S. Moos. Am. J. Roentgenol. Radium Therapy Nuclear Med. 68, 797-800(1952) Nov.

Design is reported of a fully automatic computer, which electronically integrates the dose around a complete rotation during the application of rotation x-ray therapy. The instrument is said to be useful for other x radiation techniques also. (C.H.)

TOXICOLOGY STUDIES

2245

Los Alamos Scientific Lab.

THE USE OF Ca EDTA IN CASES OF LEAD INTOXICATION, by Elston L. Belknap, Harry Foreman, Harriet L. Hardy, and Thomas L. Shipman. July 1952. 6p. (AECU-2426; LADC-1364)

Clinical experiences to date in the use of Ca ethylenediaminetetraacetate (Ca EDTA) in cases of Pb poisoning are summarized and a dosage schedule based on toxicity studies in animals is presented. (C.H.)

2246

Knolls Atomic Power Lab.

A PARTIAL RÉSUMÉ OF THE USE AND TOXICITY OF MERCURY AND PREVENTION OF MERCURIALISM IN INDUSTRY WITH SPECIAL REFERENCE TO THE APPLICATION OF MERCURY IN THE SIR PROJECT, by Harold N. Hackett and Preston W. Reynolds. Jan. 25, 1952. 378p. (KAPL-ADM-701)

The purpose of this report is to present in a brief but authoritative manner a résumé of operating experience with electric-power-generating equipment using mercury and

mercury vapor. Particular emphasis is placed upon the methods and procedures developed for controlling the medical hazards to operating personnel resulting from mercury toxicity in power plants and research laboratories. The successful solution of the medical problems by means of adequate design and manufacture of the various components made mercury leakage, with its resulting mercury exposure for the operating personnel, a relatively minor operating hazard. The accurate detection of the presence of mercury vapor in room air and the maintenance of good housekeeping contributed in a major degree to the freedom from mercurialism. (auth)

TRACER APPLICATIONS

2247

A PRELIMINARY REPORT ON THE USE OF GALLIUM^{72} IN CLINICAL TRACER STUDIES. E. R. King, M. W. Mason, and H. C. Dudley. Radiology 59, 844-7(1952) Dec.

Clinical tracer studies utilizing Ga^{72} have demonstrated increased Ga localization in 8 out of 14 patients with definite bone metastases. Eleven patients with proved malignant growth showed no definite radiographic evidence of bone metastases but did have advanced hypertrophic arthritis. In 8 of these 11 cases there was increased deposition of Ga over the arthritic areas. On the basis of these results, Ga^{72} does not appear too promising as a clinical diagnostic tool. It is anticipated that further studies will present more conclusive results. (auth)

2248

THE SEPARATION AND DETERMINATION OF ^{24}Na AND ^{32}P IN ANIMAL TISSUES. A. H. Ennor and H. Rosenberg. Biochem. J. 52, 591-3(1952) Dec.

A method for the quantitative estimation and separation of P^{32} and Na^{24} from a mixture of each in body fluids and tissues is described. P^{32} is extracted as a molybdate complex into isobutanol. Na^{24} remains in the aqueous phase. (auth)

2249

APPLICABILITY OF RADIOACTIVE DYES IN TUMOR DIAGNOSIS. H. Cramer, H. W. Pabst, and A. Treibs. Z. Krebsforsch. 58, 453-9(1952) Oct. 1.

Case histories of 16 patients diagnosed for various tumors with I^{131}-labeled Na diiodofluorescein and diiododeuteroporphyrin are summarized. (G.Y.)

2250

THE EFFECT OF THIOURACIL ON THE COLLECTION OF RADIOACTIVE IODINE IN EXPERIMENTALLY INDUCED THYROID TUMORS. William L. Money, Patrick J. Fitzgerald, John T. Godwin, and Rulon W. Rawson. Cancer 6, 111-120(1953) Jan.

Radioautographs correlated with morphological studies demonstrate the presence of I^{131} in a number of thyroid tumors and abnormal follicles induced in rats maintained on thiouracil for periods of time up to 700 days before being given a tracer dose of I^{131}. It is suggested that the tissues escaped the normal block imposed by thiouracil. Three possible explanations of why thiouracil failed to prevent binding of I are discussed. (C.H.)

2251

AUTORADIOGRAPHIC OBSERVATIONS WITH S^{35} ON THE CORPUS LUTEUM OF THE RABBIT. Erik Odeblad. Acta Endocrinol. 11, 306-10(1952) Dec.

Autoradiography with S^{35} of the corpus luteum of the rabbit shows no detectable or very small amounts of labeled sulfate enter into the lutein cells. Moderate amounts of labeled sulfate enter into the connective tissue of the mature corpus luteum; large amounts in the case of old corpora lutea. Labeled sulfur present in the follicular fluid is not specifically utilized by the growing corpus luteum. (auth)

2252

AN AUTORADIOGRAPHIC STUDY WITH P^{32} OF THE RABBIT UTERUS. Erik Odeblad and Bjorn Westin. Acta Endocrinol. 11, 311-16(1952) Dec.

The autoradiographic picture with P^{32} (mainly in nucleic acids) of the rabbit uterus was studied in castrates, after treatment with oestradiol monobenzoate and progesterone and in anoestrous animals. The epithelium contained larger amounts of P^{32} than the myometrium and the myometrium more than the endometrial stroma within each experimental group. Oestrogen increased the amount of P^{32} in all layers. Progesterone superimposed upon oestrogenic stimulation caused an additional increase, especially in the endometrial epithelium. The pictures of anoestrous animals resembled those of the castrates, and three days of oestrogen-withdrawal had no appreciable effect. (auth)

2253

A COMPUTATIONAL PROCEDURE FOR THE ISOTOPE METHOD OF BRAIN TUMOR LOCALIZATION. Alexander Langer and Robert Loevinger. Science 117, 247-8(1953) Mar. 6.

A method of brain tumor localization using artificial averages of radiometric measurements taken at standard positions on the skull surface is described. Diiodo^{131}-fluorescein and I^{131}-iodinated human serum albumin were used in the development of this technique. (G.Y.)

2254

THORIUM B LABELLED RED CORPUSCLES. E. Alexander. Arkiv Kemi 4, 363-8(1952). (In English)

The ThB produced in rabbit blood by decaying thoron is found to be almost quantitatively taken up by the corpuscles. Only 2% of the total ThB content remains in the plasma phase. A similar result is obtained when a solution of ThB + C collected originally in an electric field is dissolved in blood. The distribution between plasma and corpuscles of RaD obtained from tubes which formerly contained radon also was found to be essentially the same. The uptake of ThB-labeled Pb by the corpuscle phase was much less pronounced. The ThB content of the plasma phase amounted in this case to 16% of the total activity of the blood. The Bi isotopes ThC and RaE showed no pronounced preference for the corpuscle phase and were found in about equal amounts in equal weights of plasma and corpuscles. (auth)

CHEMISTRY

2255

[Massachusetts Inst. of Tech.]

CHEMISTRY OF THE FISSION ELEMENTS GROUP. [nd] 13p. (AECU-2404)

Work is briefly reported on formation of thiocyanate complexes of Zn; reduction of cyanide complexes of Cd; formation of chloride complexes of Cu; analytical chemistry of Ce, Nb, and In; photometric titrations; flame photometry; thermometric titrations; determination of trace amounts of Ag by its catalytic effect; fluorimetric determination of Sm; studies with a high-frequency titrimeter; polarography with stationary electrodes; the electrodeposition behavior of metals at a Hg electrode; spectrophotometric determination of heavy metals; and separation of the rarer elements. (L.T.W.)

2256

University of Southern Calif.

THE MECHANISM OF EXCHANGE OF HYDROGEN GAS AND AQUEOUS ALKALI, by W. K. Wilmarth, June C.

Dayton, and J. M. Flournoy. [nd] 20p. (NP-4335; U-23786)

An attempt was made to clarify the mechanism of the exchange process by repeating, in greater detail, Abe's experiments (Sci. Papers Inst. Phys. Chem. Research (Tokyo) 38, 287(1941)). Para H, prepared and analyzed according to the methods of Wilmarth and Baes (J. Chem. Phys. 20, 116(1952)), was used instead of an isotopic tracer. The conversion of para H in aqueous alkali (KOH) solutions was shown to be a homogeneous nonphotochemical process with a rate which was first-order with respect to both H-gas and OH^- concentration. The rate constant in the temperature region 80 to 110°C could be represented by the expression $k^\circ = 8.5 \times 10^{11}\ e^{-23,800/RT}$ liter $mole^{-1}$ min^{-1}. The exchange of D gas to produce HD occurred at approximately the same rate under comparable conditions. (TID-LC)

2257

University of Southern Calif.

THE CONVERSION OF ORTHO-PARAHYDROGEN BY CUPROUS ACETATE IN QUINOLINE, by W. K. Wilmarth and Max K. Barsh. [nd] 24p. (NP-4336)

The conversion of ortho-parahydrogen by cuprous acetate in quinoline has been studied over the temperature range 60 to 100°C. The rate of the conversion can be represented by the equation:

$$\frac{-d(p-H_2)}{dt} = 6.6 \times 10^{11} \exp \frac{-16,000}{RT}$$

$$(\text{liter/mole/min})^2(CuOAc)^2(H_2).$$

It has been verified experimentally that the same activated intermediate is formed during the cuprous acetate-catalyzed hydrogenation of cupric acetate and the conversion process. This conclusion has been substantiated further by a calculation of the rate of hydrogenation from the rate constant for the parahydrogen conversion. The exchange of deuterium gas with a solution of cuprous acetate in quinoline has also been observed. (auth)

2258

University of Southern Calif.

THE MECHANISM OF THE EXCHANGE OF HYDROGEN GAS WITH SOLUTIONS OF POTASSIUM AMIDE IN LIQUID AMMONIA, by W. K. Wilmarth and June C. Dayton. [nd] 19p. (NP-4339; U-23788)

The rate of para H conversion was proportional to the amide ion and para H concentrations. The specific rate constant at –50°C was 7740 liter $mole^{-1}$ min^{-1}, and the exchange rate of D with liquid NH_3 solutions of amide was approximately the same. The presence of HD as an intermediate product indicates that the conversion of D to H is not a one-step process, an action which would occur if the two H atoms on the amide ion were displaced in a single step. A mechanism for the amide ion catalysis is proposed. (cf. TIP U18415) (TID-LC)

2259

REACTION OF CARBON WITH STEAM AT ELEVATED TEMPERATURES. B. E. Hunt, Shiro Mori, Sidney Katz, and R. E. Peck. Ind. Eng. Chem. 45, 677-80(1953) Mar.

Data are presented on the reaction of C with steam in the 1800 to 2500°F range. In this range the equilibrium products are almost entirely CO and H_2, although some CO_2 and H_2O are usually present indicating the incomplete nature of the reaction. The data indicate a transition from surface or chemical-reaction controlling to diffusion controlling at ~2100°F. It appears that the reaction rate is increased very slightly, if at all, by increasing the temp. beyond this comparatively low transition point. (L.M.T.)

2260

ON THE SEQUENCE IN THE COMPLETION OF THE ELECTRON LEVELS OF ATOMS. V. M. Klechkovskiĭ. Zhur. Eksptl'. i Teoret. Fiz. 23, 115-22(1952) July. (In Russian)

The general regularity of the sequence (with increasing atomic number) of completion of quantum electron levels was investigated. It was found that this regularity could be determined with the help of a classification of the levels according to the sum of principal and orbital quantum numbers. (tr-auth)

AEROSOLS

2261

Naval Radiological Defense Lab.

DUST SAMPLING BY THERMAL PRECIPITATION, by I. G. Poppoff. Dec. 8, 1952. 18p. (USNRDL-382)

The theory of thermal precipitation is summarized and its applicability to the operation of aerosol collectors is considered. The essential characteristics of thermal precipitators are discussed. Results from limited investigations of the operating characteristics of one type of thermal precipitator are included. (auth)

ATOMIC WEIGHTS AND PERIODIC SYSTEMS

2262

LENGTH OF PERIOD IN MENDELEEV'S SYSTEM AS A FUNCTION OF MAXIMUM VALUE OF AZIMUTHAL QUANTUM NUMBER IN PERIOD. D. A. Bochvar. Zhur. Fiz. Khim. 26, 1059-60(1952) July. (In Russian)

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

2263

New York Univ.

ANNUAL PROGRESS REPORT ON THE NATURE OF CRYSTAL GROWTH FROM SOLUTION, by John E. Vance and S. Z. Lewin. Aug. 1, 1952. 37p. (NYO-3514)

Crystallization of $PbCl_2$ from various aqueous media indicates that the formation and growth of the crystals are favored by dilute HCl and by all concentrations of $HClO_4$ but are hindered in water and in concentrated solutions of HCl and of NaCl. Approximately 200 g of large and well-formed crystals of $SrSO_4$ were prepared by the new procedure of extractive crystallization. A counting technique for Sr^{89} was tested and adapted to the needs of the investigation. A procedure for measuring the exchange between Sr^{89} ions and $SrSO_4$ crystals (and between $S^{35}O_4$ ions and $SrSO_4$ crystals) has been devised. Preliminary experiments indicate that two processes are probably involved in the system; tentatively it is assumed that there is a rapid process of exchange and adsorption followed by a very much slower diffusion process. Well-formed crystals (0.01 to 0.1 mm in dimensions) of $Sr^{89}SO_4$ were prepared and a new technique for measuring the rate of dissolution of salts containing radioisotopes has been devised and tested. It was discovered that a mold could concentrate the activity in the solution so that it was necessary to repress its growth. Experiments are now in progress to develop the technique of the measurement. (J.E.D.)

DEUTERIUM AND DEUTERIUM COMPOUNDS

2264

SELECTIVE REDUCTION OF THE UNSATURATED COMPOUNDS: DEUTERIZATION OF THE RANEY NICKEL CATALYSTS. N. A. Khan. Science 117, 130(1953) Feb. 6.

Deuterization of several Raney nickel catalysts by saturation with D_2 gas is described briefly. (G.Y.)

2265

THE NATURAL CONCENTRATION OF DEUTERIUM IN HONEY. T. C. Helvey. Science 117, 276-7(1953) Mar. 13.

The concentration of HD in buckwheat honey was determined mass-spectrographically. Increments over the D

concentration in rain and lake water of 17 to 30% were found. A specific D affinity of the invertase in the bee stomach, which could build D atoms into sugar molecules at some point in the hydrolytic process, is suggested. (G.Y.)

GRAPHITE

2266

[Chicago Univ.]

PROGRESS REPORT [ON THE STRUCTURE AND PROPERTIES OF GRAPHITE]. [nd] 19p. (COO-150)

Graphite filaments, when annealed at 3000°C, showed a disappearance of the previously found x-ray line broadening. A pin-point Laue diagram indicated a grain size for the annealed filaments of 10^{-3} to 10^{-5} cm. From a plot of electric resistivity vs. temperature from 250 to 1600°C, a flat minimum of resistivity was found for unannealed filaments at ~1000°C which disappeared on annealing. The reaction kinetics of hydrocarbons with graphite are reported. The electric conductivity of natural graphite was measured in the frequency range 0.5 to 20 Mc to distinguish between surface conductivity and bulk conductivity. The structure of graphite single crystals was studied. (L.T.W.)

2267

North American Aviation, Inc.

THE RELAXATION TIME OF CONDUCTION ELECTRONS IN GRAPHITE, by J. S. Lomont. Oct. 20, 1952. 31p. (NAA-SR-205)

The general features of the Boltzmann equation and the relaxation time are briefly reviewed, and, from the Boltzmann equation, an equation for the field-free relaxation time is derived. This equation together with the tight-binding approximation is then used to develop a general procedure for obtaining the energy dependence of the relaxation time due to defect scattering. This general procedure is applied in detail to the two-dimensional model of graphite, and the energy dependence of the relaxation time is explicitly determined. Some indicative calculations are then made on the three-dimensional model, but the complete calculation is not carried out because of the complexity of the problem. (auth)

LABORATORIES AND EQUIPMENT

2268

North Carolina State Coll.

PROGRESS REPORT NO. 4 [ON] THE MEASUREMENT OF THERMAL PROPERTIES OF NON-METALLIC MATERIALS AT HIGH TEMPERATURES, COVERING PERIOD ENDING DECEMBER 31, 1952, by E. B. Finch and K. O. Beatty, Jr. Jan. 29, 1953. 14p. (ORO-87; Progress Report No. 4)

The design, construction, and operation of apparatus to determine thermal properties by an unsteady-state method are described. Two apparatuses, one to operate at 1500 to 2500°F and one at 100 to 450°F, are included. The general principle of operation is the same for both, but the designs differ considerably. Alternate shapes such as slabs and cylinders are used. (See ORO-65 for preceding period.) (auth)

MOLECULAR STRUCTURE

2269

THE STRUCTURE OF PSEUDOBENZENE OR BORAZOLE $B_3N_3H_6$ IN THE SOLID STATE, by Mario A. Rollier. Translated by Mary E. Lee, from Gazz.chim. ital. 81, 272-5(1951). 4p. (AEC-TR-2007; CF-53-2-228)

RADIATION CHEMISTRY

2270

Polytechnic Inst. of Brooklyn

FINAL REPORT ON A PROGRAM OF RESEARCH ON THE EFFECT OF ULTRAVIOLET LIGHT ON ENZYMES AND VIRUSES, by A. D. McLaren. 141p. (AECU-2398)

Data are presented from studies on the kinetics of photochemical inactivation of enzymes, viruses, and related substances by ultraviolet light; the supposed absorption of ultraviolet light by the peptide bond at 2800 A; the dependence of the quantum yield of trypsin on pH; absorption spectra and molecular weights; quantum yields and molecular weights; the proportionality between appearance of titratable groups and molecules of inactivated chymotrypsin; the photochemistry of proteins; the irradiation and titration of a mixture of amino acids corresponding in composition to chymotrypsin; chromatography of chymotrypsin hydrolysis products, and the stabilizing influence of caprylate on chymotrypsin and bovine plasma albumin. (C.H.)

RARE EARTHS AND RARE-EARTH COMPOUNDS

2271

METHODS FOR PREPARATION OF PURE SCANDIA. Vasudeva Kilara Iya. Compt. rend. 236, 608-10(1953) Feb. 9. (In French)

The Sc mineral thortveitite is roasted with an excess of carbon at 1800°C, and the resulting carbides are dissolved with HCl giving a solution of Sc oxide containing over 10% of rare-earth oxides. The latter are removed by fractional precipitation or ion exchange. (G.Y.)

SEPARATION PROCEDURES

2272

Columbia Univ.

ANNUAL PROGRESS REPORT [ON] SEPARATION OF ISOTOPES BY CHEMICAL EXCHANGE IN THERMAL DIFFUSION COLUMNS, by William P. Senett, Russel W. Pierce, Fred Gollob, and T. I. Taylor. July 1, 1952. 56p. (NYO-625)

Progress is reported on chemical exchange effects in thermal diffusion columns, kinetics and catalysis of the isotopic exchange of C^{13} between CO and CO_2, construction of new exchange column for H-D systems, modification of mass spectrometer for the determination of D in H and conversion of water to H for D analysis; study of pressure gradient in binary diffusion at relatively high pressure and isotopic enrichment of Li salts by thermal diffusion in an aqueous medium. (J.E.D.)

2273

[Pittsburgh Univ.]

REPORT ON VISIT OF HENRY FREISER TO THE ATOMIC ENERGY RESEARCH ESTABLISHMENT AT HARWELL, ENGLAND, ON SEPTEMBER 10, 1952, by Henry Freiser. [nd] 2p. (TID-5130; AEC-43/552)

2274

ISOLATION OF TECHNETIUM. S. Tribalat and J. Beydon. Anal. Chim. Acta. 8, 22-8(1953) Jan. (In French)

A quantitative study of the extraction of Tc in the form of tetraphenylarsonium pertechnetate by chloroform is presented. The method has been used to separate the element after production from Mo or from U fission. (tr-auth)

2275

TWO-COMPONENT SEPARATIONS BY DOUBLE-SOLVENT EXTRACTION; DIAGRAMS FOR DETERMINING OPERATING CONDITIONS. A. Klinkenberg. Ind. Eng. Chem. 45, 653-7 (1953) Mar.

In a recent paper by Klinkenberg, Lauwerier, and Reman (Chem. Eng. Sci. 1, 93(1951)) the problem of finding the conditions required for a two-component separation using two solvents in countercurrent flow, with given feed and product composition, was solved. An exact and general graphical method was given and simpler approximations were also indicated. In this paper, the solutions are presented in the form of graphs, ready for use. (auth)

2276

PHOSPHORUS COMPOUNDS IN THE CELL. 2. THE SEPARATION BY IONOPHORESIS ON PAPER OF THE CONSTITUENT NUCLEOTIDES OF RIBONUCLEIC ACID. J. N. Davidson and R. M. S. Smellie. Biochem. J. 52, 594-9 (1952) Dec.

A method is described for the separation of ribonucleotides by ionophoresis on paper. It can be applied to the analysis of a ribonucleic acid after alkaline digestion or to the ribonucleotide fraction obtained from a tissue by a modification of the method of Schmidt and Thannhauser. (auth)

SORPTION PHENOMENA

2277

SOLUTION AND ADSORPTION OF HYDROGEN BY DISPERSED PLATINUM-PALLADIUM ALLOYS. A. I. Stetsenko and I. I. Tverdovskiĭ. Zhur. Fiz. Khim. 26, 647-58(1952) May. (In Russian)

SYNTHESES

2278

SYNTHESIS OF CYCLOBUTENE-d_6 AND CYCLOBUTANE-d_8. R. C. Lord. J. Chem. Phys. 21, 378(1953) Feb.

The cyclobutene synthesis given by Cope et al. (J. Am. Chem. Soc. 74, 4867(1952)) has been modified to prepare cyclobutene-d_6, which can easily be deuterated to cyclobutane-d_8. (G.Y.)

2279

SYNTHESES OF METHYLAMINE-C^{14} AND DIAZOMETHANE-C^{14}. A. Russell Jones and Walter J. Skraba. Science 117, 252-3(1953) Mar. 6.

Methylamine-C^{14} was prepared in 98% yield by reduction of $KC^{14}N$ at room temperature by H_2 and PtO_2 in dilute H_2SO_4. Diazomethane-C^{14} was obtained in 54% yield by way of (methyl-C^{14})-urea and N-nitroso-N-(methyl-C^{14})-urea. (G.Y.)

ENGINEERING

HEAT TRANSFER AND FLUID FLOW

2280

Stanford Univ.

TECHNICAL REPORT NO. 14 [ON] BASIC HEAT TRANSFER AND FLOW FRICTION DESIGN DATA FOR GAS FLOW IN CIRCULAR AND RECTANGULAR CYLINDRICAL TUBE HEAT EXCHANGERS, by W. M. Kays. June 15, 1951. 41p. (NP-4309; Technical Report No. 14; U-18044)

An investigation was made of the applicability of currently used heat transfer and flow friction correlations for gas flow through small circular and rectangular tubes. Test results are reported for the flow of air inside 0.213-in.-diam. circular tubes and in the rectangular passages formed by the fins of a plain plate-fin heat exchanger system. These data are compared with currently used heat transfer and flow friction correlations and also with data obtained by previous investigators. In the laminar flow region it is found that the analytical heat transfer solution is well substantiated for flow in circular tubes. For turbulent flow a modification of currently accepted heat transfer correlation is proposed. The analytical solution of Langhaar for the pressure drop in the entrance region of a circular tube in laminar flow is employed to deduce friction factors that agree quite well with experiment. The turbulent flow friction factors obtained by experiment agree with currently used correlations. The laminar flow characteristics of rectangular tubes vary with the aspect ratio of the rectangular cross section. Analytical data for the friction factors are confirmed by experiment. However, there are no analytical heat transfer solutions for rectangular tubes except for infinite and unity aspect ratios. In the turbulent flow region the heat transfer and friction characteristics differ only slightly from those of circular tubes. The dip region of transition from laminar to turbulent flow in circular tubes extends from about Re = 2000 to Re = 10,000. A considerable variation in tube-to-tube performance is noted in this range which is a region of design uncertainty. Transition for rectangular tubes tends to occur at a somewhat lower Reynolds number. Since there is no dip at the point of transition, there is little design uncertainty. (TID-LC)

2281

Alfred Univ.

HIGH TEMPERATURE THERMAL DIFFUSIVITY FURNACES AND TECHNIQUES FOR MEASUREMENT, by W. B. Crandall and G. E. Potter. Jan. 1, 1953. 18p. (NP-4389)

A low temperature (200 to 1400°C) and a high temperature (1000 to 2000°C) thermal-diffusivity apparatus is described. The high-temperature apparatus incorporates a low-temperature as well as a high-temperature furnace, so that it is possible to measure two sets of thermal constants, one at each temperature all with the same setup. In addition to thermal diffusivity, this apparatus will measure Biot's modulus and surface heat-transfer coefficient. (auth)

2282

MODELING OF PHENOMENA OF HEAT EXCHANGE IN SOLID MASS WITH INTERNAL HEAT SOURCES. A. K. Andreevskiĭ. Zhur. Tekh. Fiz. 22, 816-25(1952) May. (In Russian)

The author improves the known equations for computation of massive heating by radiation and finds his formulas in satisfactory agreement with experimental data.

2283

EFFECT OF THERMAL FACTOR ON INTENSITY OF HEAT EXCHANGE. A. A. Gukhman and N. V. Ilyukhin. Zhur. Tekh. Fiz. 22, 784-93(1952) May. (In Russian)

The insufficiency of computational methods based on physical constants related to the average temperature is shown, and the necessity of introducing a thermal factor as a supplementary argument is outlined. It is proven that the direction of the heat stream has no effect on the intensity of heat exchange during motion of the gas in the tube.

2284

THEORY OF WEAK CONVECTION, I. G. Shaposhnikov. Zhur. Tekh. Fiz. 22, 826-8(1952) May. (In Russian)

The method of successive approximations in solution of equations of weak, free, stationary convection in a cavity at a specified gradient toward infinity is outlined.

2285

THERMAL CONVECTION IN A SPHERICAL CAVITY. E. Drakhlin. Zhur. Tekh. Fiz. 22, 829-31(1952) May. (In Russian)

The problems of weak, free, stationary convection in a spherical cavity at a specified temperature gradient toward infinity are solved by the method of power-expansion of Grasshof's number and by using the first approximation for the temperature and the second approximation for the velocity.

2286

FREE STATIONARY CONVECTION IN AN INFINITE HORIZONTAL TUBE. E. M. Zhukhovitskiĭ. Zhur. Tekh. Fiz. 22, 832-5(1952) May. (In Russian)

The problem of weak, free, stationary convection in an infinite horizontal cylindrical cavity at a given temperature gradient toward infinity is solved by the method of power-expansion of Grasshof's number up to the second approximation, inclusive.

2287
PROBLEM OF PRACTICAL COMPUTATION OF HYDRAULIC RESISTANCE OF FAST-MOVING GASEOUS STREAMS IN PRESENCE OF HEAT EXCHANGE. P. V. Dvornichenko. Zhur. Tekh. Fiz. 22, 836-47(1952) May. (In Russian)

The differential equations of gaseous flow in cylindrical tubes in the case of permanent thermal pressure are solved in a finite form. The coefficient of resistance and the characteristics of geometrical dimensions of the channel are eliminated by application of the basic relation of the hydrodynamic theory of heat exchange.

2288
STUDY OF HEAT RELEASE DURING CONDENSATION OF FREON-12 IN HORIZONTAL SMOOTH AND RIBBED TUBES. E. E. Slepyan. Zhur. Tekh. Fiz. 22, 1109-23(1952) July. (In Russian)

Results of an experimental study on heat release of Freon-12 during condensation in horizontal smooth and ribbed tubes of various types and dimensions are outlined. The results are generalized on the basis of similarity theory and are represented in a unique and criterion form.

2289
APPLICATION OF PASTES BF-2 AND BF-4 IN EXPERIMENTS AT LOW TEMPERATURES. B. N. Samoĭlov. Zhur. Tekh. Fiz. 22, 888-9(1952) May.

Sealing of electric outlets in equipment for low temperatures is facilitated by application of the pastes described, which polymerize and become good insulators and do not crack at the temperature of liquid He.

2290
MASS TRANSFER BETWEEN SOLID WALL AND FLUID STREAMS. C. S. Lin, R. W. Moulton, and G. L. Putnam. Ind. Eng. Chem. 45, 636-46(1953) Mar.

Mechanism and Eddy Distribution Relationships in Turbulent Flow. A theoretical analysis of mass transfer between a turbulent fluid stream and the wall is presented, giving a method for determining the ratio of the turbulent to molecular mass transfer at the vicinity of the wall and the concentration distribution from the wall to the main body of the fluid. Interferometric Measurements of Concentration Profiles in Turbulent and Streamline Flow. Interferometric measurements were made of the concentration distributions near the surfaces of concentration-polarized electrodes in turbulent fluid streams verifying the theoretical eddy-distribution relationship developed. The technique of performing these measurements and the interpretation of results are described. 43 references. (L.M.T.)

2291
MATERIAL TRANSFER IN TURBULENT GAS STREAMS; CONCENTRIC FLOW. W. G. Schlinger and B. H. Sage. Ind. Eng. Chem. 45, 657-61(1953) Mar.

For turbulent processes the mechanism of molecular diffusion based upon the kinetic theory is inadequate in describing material transfer, since eddies, because of their relative motion with respect to the gas stream, transfer material at many times the rate that would result from molecular diffusion. Turbulent-transfer equations involving eddy diffusivity and eddy viscosity are cited from the literature. The results of an experiment are given where the macroscopic diffusion of natural gas and air is investigated under turbulent-flow conditions. Equipment employed provided a horizontal air stream into which a coaxial stream of natural gas was admitted. Provisions were made to determine the velocity and composition of the stream at 9 stations downstream from the point of initial mixing. 20 references. (L.M.T.)

2292
TEMPERATURE GRADIENTS IN TURBULENT GAS STREAMS; NONUNIFORM FLOW. W. G. Schlinger, V. J. Berry, J. L. Mason, and B. H. Sage. Ind. Eng. Chem. 45, 662-6(1953) Mar.

Prediction of temp. distribution in flowing streams required a knowledge of the velocity profile and a means of estimating the eddy conductivity as a function of position in the flow channel. From a search of the literature various relations are cited between eddy viscosity, eddy conductivity, Reynolds number, flow channel position, etc., which are useful in predicting the temp. distribution of turbulent gases when flowing between parallel or concentric plates. The validity of these theoretical relationships are tested experimentally by introducing 100°F air between two parallel plates (at 115° and 85°F) and measuring the velocity and temp. distribution at different downstream positions. Good agreement was found between the calculated and experimental values obtained. 26 references. (L.M.T.)

VACUUM SYSTEMS

2293
SOLVENT EVAPORATOR FOR ROTARY VACUUM PUMP. J. S. George. J. Sci. Instruments 29, 413(1952) Dec.

A device is described which permits a rotary vacuum pump to be used for evacuating systems containing volatile solvents by continually cleaning the oil. A 4-in. brass pipe 3 feet long has a section sealed off 3 in. from the top end and a row of $\frac{1}{4}$-in. holes 1 in. apart drilled around the periphery. A 2-foot section of the pipe is wound with $\frac{3}{8}$-in. tube at $\frac{3}{4}$-in. intervals. Steam is passed through the winding. The lower section is wound similarly and cold water is passed through the winding. A small rotary gear pump draws oil from the casing and delivers it into the top section of the brass pipe which is mounted on the pump casing so that the oil goes through the $\frac{1}{4}$-in. holes and flows around the steam-heated windings. Here the solvents are evaporated from the oil. The oil is cooled, collected, and returned to the pump casing. (L.T.W.)

2294
SIMPLE ROTARY VACUUM SEAL. A. G. Hayward. J. Sci. Instruments 29, 410(1952) Dec.

The rotary vacuum seal illustrated consists of a threaded boss upon which rests a neoprene washer lightly lubricated with Apiezon grease. The washer is cut from neoprene sheet, but neither the central hole nor the outer edge need to be accurately shaped. The shaft passes through the central hole in the base and carries a cupped rim bearing on the washer. The shaft is held in position by a hollow knurled nut screwed on to the boss. Atmospheric pressure produces a good seal between the rim bearing and the washer. (L.T.W.)

MINERALOGY, METALLURGY, AND CERAMICS

CORROSION

2295
Babcock and Wilcox Co.
INVESTIGATION OF METAL TRANSPORT BY LIQUID LITHIUM, by A. W. Dana, Jr., O. H. Baker, and M. Ferguson. May 15, 1952. 94p. (DC-52-27-45; [B and W]-5230; Tech. Report No. 5)

Data are summarized on the construction, operation, metallurgical and chemical investigations of six forced-circulation Li circuits of 25 Cr-20 Ni stainless alloy. These were designed to investigate metal transport by liquid Li with a temperature difference in the Li stream. The maxi-

mum Li temperature was 1350°F and the total temperature difference 500°F. Initial Li velocities at various positions within each circuit were between 0.5 to 10 fps, depending on whether heating or cooling was taking place at the particular location. Testing time on the loops successfully operated varied from 19 to 98 hr. In each case, metal deposition was present in the regenerative exchangers to such a degree that plugging occurred. This location of maximum metal deposition was not the point of lowest temperature, but did represent the area of initial significant temperature drop in the Li stream. Metal deposition also was found in the coldest portion of the loops. Corrosion appeared to be of the general-solution type, with indications of intergranular attack of precipitated carbides. Preferential attack of sigma particles also was evident in one test. An average corrosion rate of 0.038 gm/cm^2/100 hr was obtained from small diameter wires strung in the annulus of one heater. (auth)

2296

California Research and Development Co., Livermore
DYNAMIC CORROSION OF STEEL BY LIQUID BISMUTH, by O. J. Elgert and C. J. Egan. Jan. 6, 1953. 21p. (MTA-12)

Bismuth offers desirable possibilities as a heat transfer medium for nuclear application because of its low melting point, high boiling point and nuclear properties. However, such an application presents certain corrosion problems. The difficulties of containing Bi at elevated temperatures in a dynamic system prompted this investigation of the mass transfer corrosion of steel. Studies were made with thermal syphon loops, generally fabricated from the same material as the test strips, in which the test materials were subjected at 1290°F to Bi flowing at 0.1 fps under conditions defined by a Reynolds number between 3000 and 4000. The "cold spot" temperatures were maintained at 1140°F to 1165°F. The use of additives, the application of protective coatings and the corrosion resistance of some alloy steels were considered as possibilities for reducing penetration rates. Concentrations of 100 ppm Ti and 350 ppm Mg effectively reduced the penetration rate of Bi into a 5% Cr-½% Mo steel from 2000 mils per year to below 20 mils per year. Penetration rates increased sharply when Ti concentrations dropped below 25 ppm. The reduction of Bi oxides with H apparently had little effect on penetration rates. The diffusion barrier resulting from preoxidation of steel test strips limited penetration rates to 100 mils per year. However, this was not considered a satisfactory solution because of the poor resistance of films to chipping and erosion. No correlation between Cr content (steels with Cr content up to 12% were tested) and penetration rates was noted; all trials with these steels, without the benefit of additives, showed excessive penetration rates. Nickel-bearing steels were omitted from the investigation because of the known high solubility of Ni and its alloys in Bi. (auth)

2297

Kel-F APPLICATIONS IN CORROSIVE SYSTEMS. L. C. Rubin and W. O. Teeters. Corrosion 9, 100-2(1953) Mar.

A series of exceptionally heat-stable thermoplastic fluorochlorocarbons derived from chlorotrifluoroethylene and commercially available under the trade name Kel-F are highly resistant to a large number of chemicals. Their properties make them particularly attractive for use as thermoplastic protective coatings and in the form of molded separators. Some aspects of the development work and results obtained in solving corrosion problems are presented in this article. (auth)

2298

VIEWS ON THE MECHANISM OF PITTING CORROSION OF ALUMINUM. P. M. Aziz. Corrosion 9, 85-90(1953) Mar. (cf. NSA 6-6050)

Thermodynamic calculations were carried out to determine the possible corrosion reactions of Al in neutral and near-neutral aqueous solutions and the domains of stability of the various corrosion products. The quantitative electrochemical factors determining the corrosion rate are discussed. A qualitative mechanism for the initiation and propagation of a corrosion pit in Al is discussed. (auth)

GEOLOGY AND MINERALOGY

2299

Pennsylvania State Coll., School of Mineral Industries
ANNUAL PROGRESS REPORT [ON] AN INVESTIGATION OF THE MINERALOGY AND PETROGRAPHY OF URANIUM-BEARING SHALES [FOR] JULY 1, 1951 TO APRIL 1, 1952, by C. E. Weaver, H. D. Wright, and T. F. Bates. Issued Mar. 28, 1952. 40p. (NYO-3357)

Detailed investigations are in progress in an attempt to explain the nature, occurrence, associations, and origin of the uranium in black shales. Qualitative mineralogical studies show that the samples of Chattanooga shale investigated consist largely of quartz, plagioclase feldspar, 2:1 non-expanded dioctahedral clay (illite), pyrite, marcasite, muscovite, chlorite, occasionally carbonates, and carbonaceous matter. There are smaller amounts of both isotropic and birefringent apatite, tourmaline, zircon, biotite, iron oxides, garnet, halloysite, and a mixed layer clay. A quantitative mineralogical procedure has been set up involving a combination of chemical and x-ray methods of analysis. Heavy liquid separations are effective in simplifying the systems to be analyzed. Radiometric data provided by β-γ counts are as yet inconclusive. Nuclear emulsions are being employed and fluorimetric and alpha scintillation methods are being set up. (auth)

2300

New York Operations Office, AEC
A DRILL HOLE SCINTILLATION LOGGING UNIT, TYPE TU-5-A, by H. J. DiGiovanni, R. T. Graveson, and A. H. Yoli. Dec. 3, 1952. 24p. (NYO-4503)

A scintillation type γ-ray logging unit is described which will automatically plot the γ-ray activity in exploratory drill holes used in the search for U ores. The equipment is installed in a small "Jeep" stationwagon and consists essentially of a probe with associated surface circuitry, a pen strip-chart recorder, telescoping boom, motorized reel and associated control equipment. The power to operate these devices is obtained from a 60-cycle, 110-volt generator driven by the car's engine. Every means of reducing set-up time and speeding up the logging operation has been taken. The scintillation probe offers the advantage over G-M tube probes of greater efficiency hence faster operation, wide range, small detecting volume, and the opportunity to identify the radioactive material through pulse-height spectroscopy. (auth)

2301

RADIOACTIVITY OF AMPELITES. René Coppens. Compt. rend. 236, 600-1(1953) Feb. 9. (In French)

The ampelitic schists of the coal regions of northern France were examined for radioactivity with nuclear emulsions. Apart from rare exceptions, these ampelites have an activity higher than other sedimentary rocks and equal to most igneous rocks. This activity is due to U and Th, but the Th content seems small. Contrary to the case for igneous rocks, the radioactivity of the ampelites is distributed uniformly through the mass. Inclusions are very rare and generally slightly active. (G.Y.)

2302

ESTABLISHMENT OF THE METAMICT STATE IN GADOLINITE; ENERGY BALANCE IN THE RECRYSTALLIZATION. Paul Pellas. Compt. rend. 236, 619-21(1953) Feb. 9. (In French)

The ratio between the energy expended in gadolinite during the transitions to the disordered state and the energy

liberated on recrystallization is estimated for several concentrations of Th. (G.Y.)

METALS AND METALLURGY

2303

Babcock and Wilcox Co.

INVESTIGATION OF LARGE SCALE DYNAMIC LIQUID LITHIUM CORROSION APPARATUS; TECHNICAL REPORT IV, by A. W. Dana, Jr., O. H. Baker, and M. Ferguson. Apr. 30, 1952. 51p. (DC-52-25-66; [B&W]-5229; Tech. Report No. IV)

This report summarizes the results obtained from an experimental test apparatus designed to investigate the corrosion and erosion of Type-310 stainless alloy by circulating liquid Li with a temperature difference in the Li stream. During the final test period, the maximum Li temperature was 1200°F with an average temperature difference of 350°F between the high- and low-temperature portions of the circuit. Li velocities of 9 to 12 fps in the $\frac{1}{4}$-in.-ID test sections were maintained for 1037.2 hr testing time. Corrosion in the high-temperature end of the loop and metal deposition in the colder areas are described and evaluated. A corrosion rate of 0.088 g/cm²/1000 hr or an equivalent penetration of 0.011 cm/1000 hr was found at 1200°F. No corrosion was noted at 850°F. (auth)

2304

Metals Research Lab., Case Inst. of Tech.

AN INVESTIGATION OF THE MECHANICAL PROPERTIES OF TITANIUM BASE ALLOYS TO DETERMINE THE KINETICS OF THE PHASE TRANSFORMATION AND RESULTING MICROSTRUCTURES: SUMMARY REPORT FOR CONTRACT PERIOD MAY 18, 1951 TO JULY 31, 1952, by F. R. Brotzen, E. L. Harmon, and A. R. Troiano. Sept. 30, 1952. 83p. (NP-4282; U-25794)

An investigation was made of the basic mechanical properties of a series of Ti-V alloys containing 0 to 2.69% V and of the influence of phase-transformation mechanisms and the resulting microstructures on the properties. The mechanical properties were primarily dependent on the chemical composition of the alloys. Increasing the V content raised the hardness and strength levels of alloys annealed at a subcritical temperature, without a ductility loss. Heat-treatment was less influential. The response to heat varied with the alloy composition; the low-C alloy B (0.57% V, 0.027% C) appeared more responsive, particularly to aging, than the higher-C alloys. Notch-impact testing over a range from –196 to +570°C revealed a typical transition behavior in all alloys except alloy B. The impact-energy level of the latter was relatively high at all temperatures, particularly after H_2O quenching and aging. H_2O quenching followed by aging tended to shift the impact-transition curves of the alloys containing C to lower testing temperatures. The shift was observed only after a minimum aging temperature was employed which increased with higher alloy contents. The hardness was substantially unaffected by heat. Changes in microstructure resulting from the heat-treatment were not associated with significant hardness changes. The heat-treatments (H_2O quenching, quenching and aging, isothermal quenching) produced small tensile and yield-strength increases for all of the alloys except alloy B; the strength of alloy B could be substantially raised by H_2O quenching and subsequent aging at 550° to 675°C. The highest ductility values were obtained after subcritical annealing treatments. The low-V alloys attained a good ductility level at higher strengths after aging at 425° and 550°C. The effect of the aging temperature was more pronounced in the higher-V alloys. The best combinations of strength and ductility were achieved after aging treatments. Isothermal quenching yielded tensile properties inferior to those obtained by aging for all but alloy F (2.5% V, 0.215% C). (TID-LC)

2305

Columbia Univ. School of Mines

PROGRESS REPORT [ON] THE STUDY OF DIFFUSIONLESS PHASE CHANGES IN SOLID METALS AND ALLOYS [FOR] SEPTEMBER 1 TO NOVEMBER 30, 1952, by T. A. Read, M. W. Burkart, C. W. Chen, M. Wechsler, and D. S. Lieberman. [nd] 5p. (NYO-3960)

Studies on the diffusionless phase transformation in In-Tl alloys show that an increase in applied stress produces a linear increase in transformation temperature. In tension the slope of the line relating applied stress and transformation temperature is 300 g/cm²/°C compared to a value of 680 g/cm²/°C for compression. A single crystal of the tetragonal phase is never produced from a single crystal of the cubic as a result of the transformation alone. An experiment is described which furnishes evidence that the array of tetragonal twins resulting from transformation are the unique structure permitting the interface plane between the transformed and untransformed parts of a specimen to be one of zero net strain. The cubic-tetragonal diffusionless transformation of Au-Cd alloys having ~50 at.% Au was studied. The crystals showed contraction during transformation on heating and expansion on cooling; the unit length change varied with different crystals; the maximum unit length change was 0.6% in transformation on heating; a hysteresis of ~2°C was observed; and temperatures of transformation on cooling were 29, 30.5, and 31°C for 50, 49.5, and 49 at.%, respectively. A plot of coil resistance vs. time is shown for an adiabatic calorimeter to measure latent heat and specific heat of AuCd specimens. (See NYO-937 for preceding quarter) (L.T.W.)

2306

Oak Ridge National Lab.

EFFECT OF NEUTRON IRRADIATION ON SUPERSATURATED SOLID SOLUTION OF BERYLLIUM IN COPPER, by G. T. Murray and W. E. Taylor. Issued Feb. 13, 1953. 29p. (ORNL-1323)

The effect of neutron irradiation on the resistance and hardness of Be-Cu, Be-Ni, Cu-Ti, Cu-Ag and Al-Si alloys and the effect of aging at low temperature on Be-Cu alloys was investigated. It was found that the Be-Cu alloy showed large changes in resistance and hardness increase during irradiation, in contrast to the relatively negligible changes that occurred for other alloys. Retrogression, the redissolving of small precipitate particles that are too small to be stable at the higher temperatures, measured by resistivity, hardness, x-ray-diffraction, and density changes. (J.E.D.)

2307

Oak Ridge National Lab.

A SIMPLE ELECTROMAGNETIC FLOWMETER FOR LIQUID METALS, by R. M. Carroll. Issued Mar. 4, 1953. 19p. (ORNL-1461)

A method of construction of electromagnetic flowmeters from stainless steel or inconel tubing has been developed for the measurement of the flow rate of liquid Na. The experimental results of the calibration of the flowmeters have corresponded, within the limits of experimental error, to a general theoretical equation. With reasonable care in construction, the flowmeter should correspond to the formula to within 3%. (auth)

2308

Sylvania Electric Products, Inc., Atomic Energy Div.

POWDER METALLURGY IN EUROPE; A TRIP REPORT, by Henry H. Hausner. Issued Dec. 31, 1952. 47p. (SEP-120)

The author attended the following three technical and scientific meetings with powder metallurgical sessions held

in Europe in June, 1952: the Fourth International Mechanical Engineering Congress, June 4-10, at Stockholm, Sweden; an International Symposium "On the Reactivity of Solids," June 9-13, at Gothenburg, Sweden; and the Plansee Seminar "De Re Metallica," June 22-26, at Reutte, (Tyrol) Austria. The important powder metallurgy papers presented at the meetings are reviewed, and data are tabulated. (L.T.W.)

2309

ON THE PHENOMENON OF RECOVERY IN ARTIFICIALLY AGED ALLOYS OF THE TYPE Al-Cu-Mg AND DURALUMIN. V. M. Berezhiani. Doklady Akad. Nauk S.S.S.R. 87, 563-6 (1952) Dec. 1. (In Russian)

Samples of 24S Al and of an Al alloy of similar composition were aged for 12 hr at 190°C and 18 hr at 165°C, respectively, then were heated rapidly (~1000°C/min) to temperatures in the range 260 to 500°C. At ~420°C an effect analogous to hardness-recovery in naturally aged alloys was observed, a new demonstration of the identity of natural and artificial aging. (G.Y.)

2310

NATURAL AGING OF ALUMINUM ALLOYS. Yu. A. Bagaryatskiĭ. Doklady Akad. Nauk. S. S. S. R. 87, 559-62 (1952) Dec. 1. (In Russian)

Structural modifications in Al–3% Cu–1.15% Mg and Al–4% Cu single crystals during natural aging were investigated by x-ray diffraction and are compared with changes occurring during artificial aging at 170 and 218°C. 4 figures. (G.Y.)

2311

THE JOINING OF ALUMINIUM AND ITS ALLOYS. W. V. Binstead. Metallurgia 47, 81-8(1953) Feb.

Various methods of welding, brazing, and soldering Al and its alloys, as well as the use of pressure welding and adhesives, are discussed briefly. 11 figures. (G.Y.)

2312

LIQUID METAL CORROSION. Anton de S. Brasunas. Corrosion 9, 78-84(1953) Mar.

In many instances, liquid-metal corrosion is simply a solubility rate and extent of solubility. However, solubility and diffusion barriers may be developed from the components or impurities in the form of intermetallic compounds, metal oxides, nitrides, and other surface films. This paper does not discuss in detail the desirability or formation of these films, but recognizes their existence and discusses the nature and extent of interaction between a variety of metals of relatively high melting point and low melting metals which are arbitrarily referred to as "liquid metals." Such metals and alloys are those which melt below 400 or 500°C. (auth)

2313

GRAIN-BOUNDARY SLIP DURING CREEP OF ALUMINIUM. D. McLean. J. Inst. Metals 81, 293-300(1953) Feb.

Grain-boundary displacements during creep at 200°C have been measured in seven super-pure Al specimens. The tests covered a range of grain size from 1 to 9¼ grains/mm and of stress from about ⅓ to about ¾ ton/in². The curves of grain-boundary displacement plotted against time resemble the corresponding extension/time curves. The fraction of the total extension due to the grain-boundary displacements was calculated. At a constant load of ½ ton/in² this increased with decrease in grain size from about one-fiftieth for 1 grain/mm to about one-sizth for a grain size of 9¼ grains/mm. At constant grain size (4½ grains/mm) it increased with decrease in load, from about one-fiftieth for a load of 1 ton/in² to about one-fifth for a load of ¼ ton/in². A plot of grain-boundary displacement against extension due to crystal deformation is linear for all specimens, suggesting a linear interaction between these two quantities. A model for this interaction is proposed, and calculation shows it to agree with experiment within 2 : 1. (auth)

2314

CRYSTAL FRAGMENTATION IN ALUMINIUM DURING CREEP. D. McLean. J. Inst. Metals 81, 287-92(1953) Feb.

Seven specimens of super-pure Al having grain sizes of 1 to 9¼ grains/mm, were made to creep at 200°C under loads varying from about ⅓ to ¾ ton/in²; the extensions produced ranged up to 50%. Observations and measurements were made relating to the sub-crystals formed. These are consistent with a polygonization model for secondary creep and permit a quantitative check of this model to be made. Certain of the observations appear to be inconsistent with the theory of sub-crystal formation advanced by Wilms and Wood (J. Inst. Metals, 75, 693(1948-49); 79, 159(1951)). (auth)

2315

ON THE Zr-Hf SYSTEM. R. B. Russell. J. Applied Phys. 24, 232-3(1953) Feb.

Lattice parameters are given of 3 iodide Hf-Zr alloys received from the Philips Co. in Eindhoven, Holland, and of others reported in the literature. It is suggested that the discrepancies noted by Fast (J. Applied Phys. 23, 350(1952)) in the Zr-Hf system can be resolved if the units used in reporting the lattice parameters are uniquely specified. (L.M.T.)

PHYSICS

2316

Atomic Energy Research Establishment, Harwell, Berks (England)

RESISTANCE HEATERS FOR VACUUM EVAPORATION. J. G. S. Biram. Dec. 4, 1952. 11p. (AERE-EL/R-1065)

The design of heaters for thermal evaporation of substances in vacuum is considered. Three designs of heaters and useful adjuncts are described, and means for mounting them are discussed. (auth)

2317

Brookhaven National Lab.

QUARTERLY PROGRESS REPORT FOR JULY 1–SEPTEMBER 30, 1952, UNCLASSIFIED SECTION. [Feb. 1953]. 42p. (BNL-209)

Abstracts are given for research activities being reported concurrently in the scientific journals. The appropriate journal or document reference is given in such cases. Preliminary results are presented on the performance of the gray-wedge analyzer and associated circuits in analysis of the I^{131} decay scheme. Release of activity from the laboratory sewage system to the headwaters of the Peconic river was studied. Operation of the cosmotron is reported. Radiation polymerization of styrene and methyl methacrylate was studied. A clay column for decontamination of fission-product waste stream was constructed. (See BNL-189 for preceding quarter.) (L.T.W.)

2318

Ames Lab.

QUARTERLY SUMMARY RESEARCH REPORT IN PHYSICS FOR JULY, AUGUST AND SEPTEMBER, 1952. Dec. 1, 1952. 24p. (ISC-301)

Progress is reported on the following studies: β spectrum of S^{35}, angular and energy distributions of photoprotons from Al and Ta, thermal diffusivity of Th and Ni, diffusion of Na in Na_xWO_3, electric conductivity and Hall coefficient of Na_xWO_3 and thin Ag films, heat of sublimation and vapor pressure of Dy, electric resistivity of B, Hall effect in Gd and La, and electric resistivity of Y, Dy, and Er at low temperatures. (See ISC-283 for preceding quarter) (L.T.W.)

2319
Wisconsin Univ.
A CONFERENCE ON THE APPLICATIONS OF X-RAY SPECTROSCOPY TO SOLID STATE PROBLEMS [HELD] 23-25 OCTOBER 1950. [nd] 81p. (NP-4287; NAVEXOS P-1033)

This report includes papers on the following subjects: x-ray spectra and the theory of solids; recent x-ray spectroscopic work at the University of Paris; the fine structure near x-ray absorption edges of crystalline matter; improved energy-band calculations for soft x-ray emission; a versatile precision bent-crystal focusing vacuum x-ray spectrometer and preliminary measurements of the emission spectra of crystalline KCl; x-ray absorption structure in the K edges of gaseous Cl_2 and HCl; radiative and electronic excitation of x-ray states; the absorption of Se and Al in the soft x-ray region; x-ray K absorption edges of covalently bonded Cr, Mn, Fe, and Ni; a new bent-crystal spectrograph with high resolving power designed for the study of absorption spectra in the solid state; a soft x-ray spectrometer; crystals suitable for double-crystal x-ray spectroscopy in the region 3 to 15 A; backstreaming in oil diffusion pumps; and a beaded-wire G-M counter for x-ray intensity measurements. (cf. NP-3105) (L.T.W.)

2320
Columbia Radiation Lab., Columbia Univ.
PROGRESS REPORT; THIRD QUARTERLY REPORT FOR THE YEAR 1952. Sept. 30, 1952. 18p. (NP-4312; U-25161)

Progress is reported on the following studies: the generation of high frequencies (22-vane magnetrons at 2.5 mm, 34-vane magnetrons at 1.07 cm, magnetron space-charge experiment, large-ratio rising-sun magnetrons, low-field operation of magnetrons, and generation of millimeter waves by Cherenkov radiation); an automatic standing wave machine; hot grinding and hot hobbing of magnetrons; and microwave physics (hyperfine structure of the H atom, fine structure of ionized He, nuclear quadrupole resonant lines of Sb isotopes in $SbCl_3$, very-high-temperature microwave spectroscopy, and a high-resolution spectrometer. (See NP-4116 for preceding quarter.) (L.T.W.)

2321
Cryogenic Lab., Ohio State Univ.
TECHNICAL REPORT NO. 15 ON VAPOR PRESSURE OF INORGANIC SUBSTANCES. XI. GALLIUM, by Rudolph Speiser and Herrick L. Johnston. Dec. 4, 1952. 12p. (NP-4356; Tech. Report No. 15; TR-281-15)

The vapor pressure of Ga has been determined by measuring the rate of effusion of the vapor through an orifice. ΔH_0^0, the heat of sublimation of Ga at absolute zero, is 65.6 ± 0.5 kcal. The vapor-pressure data for Ga are represented by the equation $\log_{10}p\ (atm) = 8.540 - 1.200/T \times 10^4 - 0.844 \log T$. The normal boiling point, from this equation, is 2500°K. (auth)

2322
High Voltage Research Lab., Mass. Inst. of Tech.
INTERIM REPORT [ON] THE PHYSICAL AND RADIOGRAPHIC PROPERTIES OF X-RAYS IN THE 2 TO 6 MILLION VOLT RANGE, by John G. Trump. Jan. 15, 1953. 12p. (NP-4397)

An experimental and analytical study is given of the physical properties of x rays produced over a range of constant potentials from 1 to 6 Mev, together with such properties of radiographic interest as exposure time for thick metal sections, radiographic sensitivity, definition, and latitude. Also included are research on compressed gases and high-vacuum insulation and their application to charged-particle acceleration, together with a study of the feasibility of designing a compact and portable source of 4 Mev x rays of high output intensity. (auth)

2323
Radiation Lab., Univ. of Calif., Berkeley
SUMMARY OF RESEARCH PROGRESS MEETING OF DECEMBER 4, 1952, by Sergey Shewchuck. Jan. 14, 1953. 5p. (UCRL-2080)

In a n-p scattering experiment, discussed by W. P. Ball, neutrons at small scattering angles (<60°) were detected using the apparatus described in UCRL-1938, all neutrons with energies >210 Mev being counted at all angles. When the new data for 90 and 260 Mev were added to the curve plots from other published data on n-p differential cross section vs. neutron scattering angle, a rather fortuitous smooth fit resulted. The curves appear to be symmetrical and the cross section rises steeply toward 0°. (L.M.T.)

2324
Atomic Energy Project, Univ. of Rochester
STUDIES OF FLASH BURNS: THE CARBON ARC SOURCE, by Thomas P. Davis, Leo J. Krolak, and Robert M. Blakney. Nov. 28, 1952. 32p. (UR-226)

During the past five years, a carbon arc source, which is basically a 24-in. Corps of Engineers searchlight with the standard parabolic mirror replaced by an ellipsoidal reflector, has been developed for use in a study of radiant energy burns. Accessory equipment has been devised which permits control over irradiance and exposure time, with a maximum irradiance of about 30 $cal/cm^2/sec$, and a minimum exposure time of 0.1 sec. A monitoring instrument provides a continuous measurement of the radiant energy output of the arc lamp. This report describes the source and its operational characteristics. (auth)

2325
INFLUENCE OF THE DISAPPEARANCE OF ANTIFERROMAGNETISM OF NICKEL OXIDE ON THE CHEMICAL ACTIVITY OF THIS OXIDE, by George Nury. Trans. by Mary E. Lee, from Compt. rend. 234, 946-8(1952). 4p. (AEC-TR-2006; CF-53-2-49)

2326
MODELING THE MOTION OF CHARGED PARTICLES IN A TWO-DIMENSIONAL ELECTRIC FIELD TAKING INTO ACCOUNT THE SPACE CHARGE. B. V. Bobykin, V. M. Kelman, and D. L. Kaminskiĭ. Zhur. Tekh. Fiz. 22, 736-43 (1952) May.

In order to find trajectories of charged particles in a plane free of space charge, the trajectories are considered to be those of balls rolling on a rubber membrane. The author modifies this method for the case of space charge.

2327
FUNCTIONAL EQUATIONS OF THERMAL RADIATION IN THE PRESENCE OF AN ABSORBING AND DIFFUSING MEDIUM. Yu. A. Surinov. Doklady Akad. Nauk S.S.S.R. 84, 1159-62(1952) June 21. (In Russian)

Certain fundamental integral equations of macroscopic (phenomenological) kinetics of radiation are derived for the case of a system of gray bodies separated by an absorbing and dispersing medium containing sources (sinks) of heat. Such equations are the very means of analytically investigating problems of radiant exchange in the mentioned radiating system. Their derivation is very elementary and proceeds from so-called classification of types of hemispherical and volume radiation, to which the expression for radiation brightness also refers as obtained from solving the equation of radiant energy transfer.

2328
KINETIC COEFFICIENTS IN HELIUM II. I. M. Khalatnikov. Zhur. Eksptl'. i Teoret. Fiz. 23, 8-20(1952) July. (In Russian)

2329
THERMAL CONDUCTIVITY AND SOUND ABSORPTION IN HELIUM II. I. M. Khalatnikov. Zhur. Eksptl'. i Teoret. Fiz. 23, 21-34(1952) July. (In Russian)

2330

PROPERTIES OF LIQUID HELIUM 3. Bernard M. Abraham, Darrell W. Osborne, and Bernard Weinstock. Science 117, 121-6(1953) Feb. 6.

Low-temperature research on He^3 and its significance to the liquid-He problem is reviewed. Properties of liquid He^4, He^3, and He^3-He^4 solutions are discussed. 28 references. (G.Y.)

ASTROPHYSICS

2331

ABUNDANCE OF DEUTERIUM IN THE SOLAR ATMOSPHERE. D. Crespin. Bull. classe sci. Acad. roy. Belg. (5) 38, 838-50(1952). (In French)

A new estimation of the D/H abundance ratio in the solar atmosphere has been made from observations on Balmer and Paschen lines. Data for several excited states are given. Apparently, D is less abundant in the sun than in the earth. The role of the D/H relative abundance in the sun's internal structure and in its atmospheric circulation is discussed. (G.Y.)

COSMIC RADIATION

2332

Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro (Brazil)

ON THE SPREAD OF THE SOFT COMPONENT OF COSMIC RADIATION, by G. Molière. Dec. 20, 1952. 6p. (NP-4381; Physics Note No. 8)

In a recent paper (Phys. Rev. 88, 331-8(1952)), Green and Messel stated that all previous work on the spread of the soft component was subject to very large errors on various counts. Each of these criticisms is discussed in the present note, and additional theoretical work is suggested. (G.Y.)

2333

Puerto Rico Univ.

REPORT ON THE EAST-WEST ASYMMETRY EXPERIMENT OF THE ELECTRONIC COMPONENT OF THE COSMIC RADIATION. Issued Mar. 20, 1952. 19p. (NYO-3413)

The literature on measurement of the azimuthal asymmetry of cosmic radiation at different latitudes and altitudes is reviewed. Preliminary results on east-west asymmetry of the electronic component of cosmic radiation at Rio Piedras, Puerto Rico, geomagnetic latitude 29°N, longitude 66°W, and altitude 5 m above sea level are reported. Due to uncertainties in measurement, no reliable conclusions concerning the value of the observed asymmetry can be reported. A negative east-west asymmetry of the electronic component is indicated. 59 references. (L.T.W.)

2334

GENERATION OF PROTONS AND π MESONS BY COSMIC NEUTRONS. M. I. Daĭon. Doklady Akad. Nauk S.S.S.R. 86, 1093-6(1952) Oct. 21. (In Russian)

Momenta spectra of protons and π mesons produced by the neutral component at 3250 m elevation are presented. The data were obtained with a mass spectrometer of high resolving power under 9 cm of Pb. (G.Y.)

2335

EAST-WEST ASYMMETRY OF MODERATE-ENERGY NEUTRONS IN THE COSMIC RADIATION. J. C. Barton. Proc. Phys. Soc. (London) A66, 160-1(1953) Feb. 1.

An anticoincidence counter arrangement showed no significant asymmetry in the arrival of moderate-energy neutrons at sea level. It is concluded that these neutrons do not maintain the same direction as the primary cosmic-ray particles which give rise to them. (auth)

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

2336

Radiation Lab., Univ. of Calif., Berkeley

THE CRYSTAL STRUCTURE OF AMMONIUM OXIDE, by W. J. Siemons and D. H. Templeton. Jan. 19, 1953. 32p. (UCRL-2084)

At low temperatures ammonia forms the two stable hydrates $NH_3 \cdot H_2O$ and $2NH_3 \cdot H_2O$, ammonium hydroxide and ammonium oxide, respectively. The lattice constants of the hydroxide and the crystal structure of the oxide have been determined at −100°C. The structure of ammonium oxide contains planar chains of alternating ammonia and water molecules bonded by hydrogen bonds of the O−H−−N and N−H−−O type. The chains are cross linked into a three-dimensional lattice by hydrogen bonds of the latter type. The open spaces in the lattice contain the remaining ammonia molecules, each having a single hydrogen bond to the molecular lattice. (auth)

2337

NEUTRON DIFFRACTION AND ATOMIC DISTRIBUTION IN LIQUID LEAD AND LIQUID BISMUTH AT TWO TEMPERATURES. Paul C. Sharrah and G. Pedro Smith. J. Chem. Phys. 21, 228-32(1953) Feb.

Neutron-diffraction patterns have been obtained on liquid Pb and liquid Bi at two temperatures. The patterns differ only slightly at the different temperatures, the main peak being slightly shorter and broader and shifted slightly to smaller angles at the higher temperatures. The diffraction patterns have been analyzed to obtain information on the atomic distribution. The first main peak in the distribution curve for liquid Pb is at 3.40 A and represents about 9.4 atoms. The first main peak in the curve for liquid Bi is at 3.35 A and represents about 7.7 atoms. The second most prominent concentration of atoms occurs at 6.6 A for both Pb and Bi. (auth)

ELECTRICAL DISCHARGE

2338

Institute for the Study of Rate Processes, Univ. of Utah

TECHNICAL REPORT NO. 5 [ON] INDUCTION OF CHEMICAL REACTIONS IN A HIGH FREQUENCY DISCHARGE. V. ION CLUSTERS, by Kenneth A. Wilde, Bruno J. Zwolinski, and Ransom B. Parlin. [nd] 17p. (AECU-2416; Tech. Report No. 5)

Ion clusters have been shown to exist under certain circumstances. In general, polar molecules will cluster while non-polar ones will not at ordinary temperatures and pressures. Clustering is favored by low temperatures, high pressures, and low directed ion velocities. The present methods of estimation of clustering and ion-molecule potential energies are good enough to indicate orders of magnitude, but are far from being ultimately satisfactory. The exact role of clusters in chemical reactions must await a complete reexamination and extension of the present notions on such things as ion-molecule interactions, transfer of energy among molecules brought in close proximity to each other, and behavior of energy-rich clusters of molecules formed by neutralization of ion-clusters. The role of clusters or, more strictly, "sticky" collisions in charge and excitation energy transfer will also bear much scrutiny. (auth)

2339

FIELD EMISSION: LARGE CURRENT DENSITIES, SPACE CHARGE, AND THE VACUUM ARC. W. P. Dyke and J. K. Trolan. Phys. Rev. 89, 799-808(1953) Feb. 15.

Field emission was obtained from a single crystal W emitter under conditions of very high vacuum and clean surfaces. The geometry of the emitter was determined by electron microscopy permitting accurate calculation of both the

surface electric field and an average current density. The use of pulse electronic techniques extended the observations to the upper limit of the current densities for which the normal field emission was stable. Above this limit an explosive vacuum arc occurred between electrodes. From these experiments the following conclusions were drawn. (1) The wave mechanical, image force corrected theory quantitatively predicted the observed average current density up to that density for which space charge dominated the emission. (2) Space charge was effective at a current density of the order of 10^7 amperes/cm^2, where a marked deviation occurred from the usual current-voltage relationship. Space charge effects permitted the simultaneous operation of multiple emitting areas of differing geometries. (3) At a still higher critical current density in the range 10^7 to 10^8 amperes/cm^2, a field-emission-initiated vacuum arc occurred between electrodes resulting in a change of emitter geometry. Current density was the dominant criterion for the initiation of the vacuum arc. 25 references. (auth)

ELECTRONS

2340

Radiation Lab., Univ. of Calif., Berkeley

ON THE RADIATION OF A HIGH ENERGY ELECTRON IN A CONSTANT MAGNETIC FIELD, by Maurice Neuman. Jan. 9, 1953. 28p. (UCRL-2077)

The quantum mechanical radiation formula for an electron in a constant magnetic field, rigorous within the approximation of the first power of the fine structure constant, is derived. With it, the quantum effects for energies $E_{bev} < 4(10^4/H_{gauss})$ are analyzed and their importance assessed. The electron and the photon, severally, are subject to fluctuations which produce effects that are quite significant relative to the difference between the velocity of light and that of the electron, the decisive quantity at high energies. The net result however is that they are inconsequential in the domain investigated and that in its radiative aspects the system behaves, for all practical purposes, classically. (auth)

2341

ELECTRON CAPTURE. II: RESONANCE CAPTURE FROM HYDROGEN ATOMS BY SLOW PROTONS. A. Dalgarno and H. N. Yadav. Proc. Phys. Soc (London) A66, 173-7(1953) Feb. 1.

The cross sections for resonance electron capture from H atoms by protons of incident energy up to 100 kev are calculated theoretically using the perturbed-stationary-state method, and a comparison is made with the results of the Born approximation both with and without neglect of momentum transfer. (auth)

2342

THE PRODUCTION OF BREMSSTRAHLUNG IN ELECTRON-ELECTRON COLLISIONS. M. L. G. Redhead. Proc. Phys. Soc. (London) A66, 196-7(1953) Feb. 1.

An expression for the integrated cross section for radiation of a photon in electron-electron collision is derived. This is a correction of the work of Katzenstein (Phys. Rev. 78, 161(1950)). (G.Y.)

2343

THE THEORY OF THE THOMAS-FERMI ELECTRON DENSITY. J. S. Plaskett. Proc. Phys. Soc. (London) A66, 178-90(1953) Feb. 1.

A new modification of the Thomas-Fermi formula is derived which is similar to Weizsäcker's; this provides what is claimed to be a more plausible proof than usual of the Thomas-Fermi method. The method is applied to give a nondivergent relativistic approximation for $Z < 137/2$ and is used to demonstrate the incorrectness of the Thomas-Fermi-Dirac equation based on Foch's equation. Slater's approximation to Foch's equations is used to derive a Thomas-Fermi equation with exchange only differing from Dirac's by a change in Z. The solutions of this equation are reinterpreted and shown to be not unique, though always giving a positive electron density. (auth)

2344

AN ELECTRON IN WEAK PERIODIC ELECTRIC AND HOMOGENEOUS MAGNETIC FIELDS. A. E. Zil'berman. Zhur. Eksptl'. i Teoret. Fiz. 23, 49-54(1952) July. (In Russian)

The method of effective mass can be applied to the problem of electron motion in weak periodic electric and homogeneous magnetic fields. Expressions for the effective mass of the electron and for its eigenfunction are derived. (tr-auth)

GASES

2345

Los Alamos Scientific Lab.

NOTE ON THE SHOCK COMPRESSION OF A γ-LAW GAS, by Foster Evans. Jan. 6, 1953. 14p. (LA-1334)

The compression of a gas between a uniformly moving piston and a rigid wall is discussed in the one-dimensional case. Expressions are derived showing the relation between the density, pressure, temperature, and entropy, respectively, produced behind the initial shock caused by the piston, and the values of these quantities after any number of reflections of the shock from piston or rigid wall. It is shown that the limiting value (as the number of reflections goes to infinity) of the quantity $S = pV^\gamma$ divided by its value behind the initial shock is given by

$$\frac{S_\infty}{S_0} = \frac{[\Gamma(a)]^{\gamma-1}}{a}, \quad (1 < \gamma < \infty),$$

where $a = 2\gamma/(\gamma-1)$, γ is the ratio of specific heats, p is the pressure, and V is the specific volume of the gas. (auth)

2346

ON DRICKAMER'S MODIFICATION OF THE THEORY OF THE THERMAL DIFFUSION COLUMN. Kozo Hirota and Yasushi Kobayashi. J. Chem. Phys. 21, 246-9(1953) Feb.

By use of thermal diffusion columns, the N_2-H_2 system has been separated continuously and its thermal diffusion ratio α has been determined with a method of least ambiguity under a pressure range of 1 to 12.6 atm. The α-values thus obtained, based on the Furry-Jones theory of the apparatus, have been found to be not constant and also to differ very much in most cases from those hitherto reported. However, the values corrected according to the theory modified by Drickamer et al. (J. Chem. Phys. 18, 945(1950)) have been shown to be reasonable, supporting their modified theory. (auth)

INSTRUMENTS

2347

Los Alamos Scientific Lab.

HIGH-SPEED TURBINE DRIVEN ROTATING MIRRORS, by Willard E. Buck. [nd] 16p. (AECU-2423; LADC-1317)

A rotating mirror is the basic element in the highest-speed cameras of both the framing and sweeping image types. The factor of merit of these cameras is determined mainly by the peripheral speed of the mirror. The turbine drive described here will spin the best-quality steel mirror up to the mirror's bursting speed. Flat mirrors with faces 17.5 mm wide by 21 mm perpendicular to the rotational axis are operated regularly at 10,000 rps. A camera designed to use these turbines and to take pictures at the rate of 3,500,000 fps, with an exposure time of 0.1 μsec, is illustrated. (auth)

2348

Sloane Physics Lab., Yale Univ.

A MULTI-CHANNEL PULSE HEIGHT AND DELAY TIME RECORDER. William C. G. Ortel. Mar. 1, 1953. 20p. (AECU-2431; Technical Report No. 7)

An instrument is described which records both the height of a voltage pulse from a scintillation counter and the delay time between this pulse and a pulse from a BF_3 neutron counter. For each scintillation pulse, a delayed pulse is produced whose delay time is a linear function of the scintillation pulse height. This delay time and the neutron delay time are recorded in binary notation on a moving paper chart. Pulse heights are recorded in forty channels and neutron delay times in fifteen channels. (auth)

2349

Carbide and Carbon Chemicals Co. (K-25)

A DETECTOR FOR SODIUM VAPOR — A SURFACE IONIZATION SODIUM DETECTOR, by H. S. McKown. Issued Feb. 16, 1953. 12p. (K-996)

A surface ionization detector has been developed which can measure as low as 2 ppm of sodium vapor in an atmosphere of helium. Since the response is not linear with concentration and reproducibility is poor, the instrument can be used only for rough indicating measurements such as an alarm device. (auth)

2350

Cryogenic Lab., Ohio State Univ.

TECHNICAL REPORT NO. 16 [ON] AN R-F ENERGY REGULATOR USED TO CONTROL HIGH TEMPERATURES IN THERMODYNAMIC MEASUREMENTS, by Loren E. Bollinger, Rudolph Speiser, and Herrick L. Johnston. Dec. 15, 1952. 28p. (NP-4349; Tech. Report No. 16; TR-281-16; U-26226)

An r-f energy regulator, an improved version of that described by Speiser et al. (Rev. Sci. Instruments 20, 385 (1949)), was developed for controlling high temperatures in thermodynamic measurements. The modification consists essentially of a new method of coupling the oscillator. The regulator output is fed to a small permanent-magnet-type motor which, through a gear reduction, rotates the shaft of a phase controller. The controller is a 3-phase motor with a wound rotor which provides a-c bias for the thyratrons in an induction heater. As the position of the phase controller is changed, the d-c voltage to the oscillator tubes is varied and the power output is changed. The method of coupling eliminates the need for a variometer in series with the r-f work coil and permits variation of the power output of the induction heater from zero to maximum. (TID-LC)

2351

Columbia Univ.

QUARTERLY PROGRESS REPORT [ON] AN APPARATUS FOR THE DETERMINATION OF THE CRITICAL TEMPERATURE OF SODIUM, by W. A. Selke and M. M. Makansi. Oct. 1, 1952. 11p. (NYO-3099)

A design of an apparatus for the determination of the critical temperature of Na is presented. The method is based on the difference between the electrical resistivities of Na vapor and Na liquid as a function of temperature. This difference should decrease as the critical point is approached and vanish when the critical is reached. Construction of the apparatus has started. (auth)

2352

A DEVICE FOR CHARGING ELECTROSCOPES. A. O. Mathai. J. Sci. Instruments 29, 337(1952) Oct.

The glass portion of a glowing filament lamp working on 230-v a-c mains is negatively charged by thermionic emission. A small mica condenser (0.1 μf) connected in parallel stabilizes the potential at the peak value. The voltage can be regulated by use of a rheostat in the filament circuit and can be used for charging electroscopes. (L.T.W.)

2353

A MEANS OF STABILIZING THE FIELD OF AN ELECTROMAGNET. G. Suryan. J. Sci. Instruments 29, 335-6(1952) Oct.

A simple method, applicable to any electromagnet, of keeping the magnetic field steady against changes in line voltage of several per cent is described. In ordinary magnets operating at about 1 kw, 1% fluctuations in the d-c line voltage cause maximum current changes in the coils of the order of 50 to 100 ma. If the same current is sent in the opposite direction in a control which has the same number of turns as the main coil, there will be perfect regulation of the field as far as voltage fluctuations are concerned. Since the current requirement for control is small, a battery or a voltage regulator can be used. If the magnet has two similar coils and if a sacrifice in the maximum field attainable can be made in favor of good stability, one coil may be used to obtain the magnetic field and the other to control the field. (L.T.W.)

ISOTOPES

2354

MASS OF ATOMIC NUCLEI AND THE PERIODIC LAW. II. UNSTABLE NUCLEI. E. S. Sarkisov. Zhur. Fiz. Khim. 26, 10-26(1952) Jan. (In Russian; cf. NSA 6-6108)

Periodicities in nuclear structure are analyzed, and a table of the isotopes arranged in periodic groups is presented. (G.Y.)

ISOTOPE SEPARATION

2355

Oak Ridge National Lab., Y-12 Area

THE ELECTROMAGNETIC CONCENTRATION OF THE STABLE ISOTOPES OF MERCURY, by L. O. Love and W. E. Leyshon. Aug. 23, 1951. Decl. with deletions Feb. 24, 1953. 49p. (AECD-3501; Y-805)

The isotopes of Hg have been successfully enriched in the calutron to a maximum purity of 98.30% in the case of Hg^{202}. All seven isotopes are available in enriched form as metallic Hg. Collection was accomplished by using solid silver receiver pockets which retained the Hg in the form of a low-vapor-pressure amalgam. Experimental and production problems are discussed. Production results are tabulated. A list of 19 users of the isotopes is included. (auth)

2356

Oak Ridge National Lab., Y-12 Area

THE ELECTROMAGNETIC CONCENTRATION OF SAMARIUM, by L. O. Love and W. A. Bell. Oct. 4, 1950. Decl. with deletions Feb. 24, 1953. 31p. (AECD-3502; Y-666)

Samarium has been processed in the calutron to produce enrichment of all its known isotopes. Investigation of the possible existence of Sm^{146} was also made. (auth)

2357

PHOTOCHEMICAL ENRICHMENT OF MERCURY 202. Murray Zelikoff, Leonard M. Aschenbrand, and Peter H. Wyckoff. J. Chem. Phys. 21, 376(1953) Feb.

Hg in a stream of H_2O vapor or N_2 was photochemically enriched in Hg^{202} by exposure to unreversed Hg resonance radiation from an electrodeless discharge tube containing 91% Hg^{202}. Mercuric oxide deposited in a thermal precipitator through which the reaction mixture passed after exposure to the lamp. The enriched product was found to vary in composition, depending on the conditions of the experiment. For example, at low H_2O (or $H_2O + N_2$) pressure, the enrichment appeared to be highest, about 20%; i.e., natural Hg contains 29.7% Hg^{202} and the enriched product contained 35.5% Hg^{202}. At very high pressures (20 mm H_2O + 740 mm N_2) no enrichment was detected. Thus, it appears

that the extent of enrichment depends on the pressure-broadening of the absorption line. (G.Y.)

MASS SPECTROGRAPHY

2358

Oak Ridge National Lab.

HIGH TEMPERATURE MASS SPECTROMETER OVEN, by J. R. Walton. Jan. 8, 1953. 11p. (ORNL-1473)

A high temperature mass spectrometer oven has been developed to use with the Nier-type ion source. This oven is fabricated from either tantalum or platinum. Controllable temperatures that approach the melting points of these metals (tantalum 2850°C and platinum 1755°C) have been attained. This type of oven has also afforded an opportunity to investigate the thermal ions of a number of elements. (auth)

2359

GAS SAMPLE INTAKE FOR MASS SPECTROMETER. H. Von Ubisch. J. Sci. Instruments 29, 412-13(1952) Dec.

A gas input manifold and gas sample tubes for a mass spectrometer are described. The manifold performs satisfactorily with samples as small as 0.1 to 0.2 ml (STP) and pressured of 5 mm of Hg or more. (L.T.W.)

MATHEMATICS

2360

Los Alamos Scientific Lab.

13 DIGIT FLOATING DECIMAL MODEL II C.P.C., by Dura Sweeney. [nd] 14p. (AECU-2422; LADC-1352)

Operating instructions for the Los Alamos Model II Card Program Computer (C.P.C.) are presented. The 13-digit floating decimal system of calculation is described. Card lay-out, spread read-in controls, counter controls, storage control, spread read-out control, octal conversion, and coding are discussed. (L.T.W.)

MEASURING INSTRUMENTS AND TECHNIQUES

2361

Electrona Corp.

DEVELOPMENT OF RADIACMETER IM-79( )/PD; THIRD QUARTERLY PROGRESS REPORT [FOR] AUGUST 15, 1952 TO NOVEMBER 15, 1952, by Carl Bosch. [nd] 46p. (NP-4301)

A new method for manufacturing a steel cup to be used as a bearing arrangement in the instrument was developed. A new method giving numerical values was developed for the more accurate study of the electric and magnetic forces. A corrected plate shape and defined position gave the desired electric and magnetic components. A magnetic displacement method was substituted for the shunt arrangement for the magnet. Two kinds of vacuum seals for the indicating instrument were studied. Satisfactory Pt-glass sealing experiments for the micro ionization chambers were carried out. Development of a small-size friction generator is reported. A vacuum switch was adapted for use in the radiacmeter, the switch being hermetically sealed into the glass envelope which contains the instrument. (See NP-4131 for preceding quarter.) (L.T.W.)

2362

Joint Establishment for Nuclear Energy Research (Norway)

SLOW NEUTRON SCINTILLATION DETECTOR, by A. Lundby, K. Skarsvåg, and E. Andersen. Nov. 6, 1952. 8p. (NP-4402; Jener Report No. 13)

A Sn-activated LiI crystal has been used in conjunction with an EMI 5311 photomultiplier tube to detect slow neutrons. The spectrum of pulses due to the $Li^6(n,\alpha)$ reaction in the crystal was recorded and a resolution of 18% for uncollimated neutrons was obtained. The crystal has a decay time of about 0.2 μsec. It responds linearly with the energy deposited in the crystal. A simple biased electronic amplifier has been developed which consists of a single EFP 60 secondary-emission pentode with positive feedback. The pulses from the photomultiplier trigger this circuit directly, and output pulses are produced which operate a scaling unit. (auth)

2363

Technical Operations, Inc.

RESEARCH STUDY LEADING TO THE USE OF TRANSISTORS IN RADIAC SURVEY METERS; QUARTERLY PROGRESS REPORT NO. 2, [FOR] OCTOBER 1, 1952 THROUGH DECEMBER 31, 1952, by A. R. Pearlman and R. R. Smyth. [nd] 27p. (TOI-52-8; Progress Report No. 2)

Further research studies to determine the feasibility of using transistors in radiac survey meters include: testing of transistors as oscillating elements in a high-voltage rectifier-oscillator power supply; adaptation of a transistor-delay univibrator as a counting-rate meter in conjunction with a Geiger counter; operation of junction transistors as voltage amplifiers in conjunction with electrometer tubes in "Cutie-Pie"-type survey meters; and development of circuit junction transistor input for a dynamic condenser electrometer. A circuit schematic diagram and description are given of a transitorized, portable, Geiger-counter survey meter. (L.M.T.)

2364

Radiation Lab., Univ. of Calif., Berkeley

THE USE OF THE NUCLEOMETER SCALER AND THE FOUR PI CHAMBER TO MEASURE ELECTRON CAPTURE RADIATIONS, by D. C. Conway and J. O. Rasmussen. Jan. 7, 1953. 7p. (UCRL-2076)

Here are reported the results of an investigation concerning the applicability of the 4π-geometry proportional counter for absolute counting of simple electron-capture decay. The isotope chosen for this study was At^{211}, where the absolute electron-capture disintegration rate is calculable from the α disintegration rate. The proportional-counter chamber was filled with methane at atmospheric pressure and various thin mounting films for the sample were used. The counting efficiency was found to vary greatly with type of mounting films and in only one case was greater than 74%. It is concluded that the 4π proportional counter is not particularly suited to absolute counting of simple electron-capture decay. (auth)

2365

RADIAC INSTRUMENTATION. Denis Taylor. J. Sci. Instruments 29, 315-22(1952) Oct.

A description is given of the main types of radiation-monitoring instruments, usually called "radiac" instruments, which would be required by the civil defense authorities in the event of atomic warfare. The instruments discussed include the flash dosimeter, individual dosimeter, dose-rate meter, and contamination meter. In each case, an account is given of the purpose of the instrument and the performance characteristics required, and some typical designs are mentioned. The paper concludes with an appendix giving the approved specifications for each instrument discussed. (auth)

2366

EXTRA HIGH TENSION FILTER BOX FOR BF_3 PROPORTIONAL COUNTERS. J. Sharpe. J. Sci. Instruments 29, 409-10(1952) Dec.

A high-tension filter box for BF_3 proportional counters is described which prevents electric breakdown, across the glass-metal seal insulating the anode wire from the envelope, caused by the humidity of the atmosphere. The high-tension filter unit, the load resistor, and the feed condensers are contained in a hermetically sealed, desiccated box to which the counter is bolted. The silica gel desiccator is fixed to the lid of the box which is bolted on to the top flange with a

rubber gasket interposed. The filter unit is screened from the output side and the only unfiltered plug on the box is at earth potential. (L.T.W.)

2367

DIFFUSION OF URANIUM IN NUCLEAR EMULSIONS LOADED WITH SILK THREADS IMPREGNATED WITH URANYL ACETATE. J. Catala and J. Casanova. Euclides (Madrid) 13, 18-19(1953) Jan. (In Spanish)

During the course of a nuclear-emulsion study on ternary and quaternary fission of U^{235} by thermal neutrons, the fissions were localized by loading the emulsion with silk threads impregnated with uranyl acetate, a method already used by numerous investigators. The first results obtained from a study of the U diffusion from the threads to the emulsion and the loss of sensitivity of the photographic grains in the neighborhood of the threads are reported. (G.Y.)

2368

THE DETECTION OF POLARIZED γ RADIATION BY THE COMPTON PROCESS. N. R. Steenberg. Can. J. Phys. 31, 204-9(1953) Feb.

The general relationship between the polarization vector describing partially polarized γ radiation and the effects measurable by scattering experiments is presented. The results are applied to the radiation emitted by nuclei aligned at low temperatures and some experimental results are predicted. (auth)

2369

NUCLEATION FROM GASES; THE DIFFUSION CLOUD CHAMBER. Alexander Langsdorf, Jr. Ind. Eng. Chem. 44, 1298-1300(1952) June.

The history of the diffusion cloud chamber is reviewed, pointing out its advantages and making suggestions concerning its use in the study of the kinetics of condensation itself and of any small aggregates that can act as condensation nuclei. 25 references. (L.M.T.)

2370

NUCLEAR STARS IN EMULSIONS. R. W. Waniek and Taiichiro Ohtsuka. Phys. Rev. 89, 882(1953) Feb. 15.

The "subtraction method" was used to determine the effect of a beam of neutrons with a narrow-energy spectrum in this study of nuclear stars in emulsions. A 1/8-in. Be target was bombarded with the proton beam of an f-m cyclotron. The outgoing neutrons in the 0° and 14° directions were collimated and two Ilford G-5 plates were exposed in good geometry, subtending the same solid angle at the target. After scanning about 400 stars for each plate, the asymmetry factor (ratio of no. of prongs in the forward to the no. of prongs in the backward hemisphere) vs. no. of prongs is plotted. It is seen that the larger stars in the 14° plate show practically an isotropic angular distribution, whereas in the 0° plate the prongs, at higher numbers, are still emitted appreciably in the forward direction. (L.M.T.)

2371

AN ELECTRON DIFFRACTION APPARATUS WITH GEIGER-MÜLLER-COUNTERS. Sven Lennander. Arkiv. Fysik 5, 391-8(1952).

An extensive description is given of an electron-diffraction apparatus with G-M counters designed to obtain a high degree of precision in intensity measurements. Preliminary measurements of the electron intensity curve for Al were recorded with the apparatus and comparison is made with a microphotogram of a photographic plate. It is seen from the comparison that background influences are reduced and much larger scales can be used in the counter curves. (L.M.T.)

2372

SOME COMMENTS ON THE RESOLUTION OF SCINTILLATION SPECTROMETERS. P. W. Roberts, Proc. Phys. Soc. (London) A66, 192-4(1953) Feb. 1.

An expression for the statistical spread in the pulse-height distribution from a scintillation spectrometer is derived and applied to the data of several published experiments with scintillators to indicate the resolution actually obtained with the instruments used. (G.Y.)

2373

DETERMINATION OF SPECIFIC ACTIVITIES OF TRITIUM-LABELED COMPOUNDS WITH LIQUID SCINTILLATORS. Earle C. Farmer and Irving A. Berstein. Science 117, 279-80(1953) Mar. 13.

Tritiated water dissolved in dioxane-terphenyl and tritiated stilbene dissolved in phenylcyclohexane-diphenylhexatriene-terphenyl liquid scintillators were counted with 7.4 and 3.8% efficiencies, respectively, relative to ionization-chamber measurements of hydrogen gas obtained by reduction of combustion water. For tritiated compounds of high specific activity, use of liquid scintillators should be a valuable, complementary method to gas counting. (G.Y.)

2374

COINCIDENCE STUDIES ON THE DECAY SCHEMES OF ^{131}I, ^{124}Sb AND ^{110}Ag BY MEANS OF SCINTILLATION SPECTROMETERS. Sven A. E. Johansson and Sune Almquist. Arkiv Fysik 5, 427-51(1952)

A description and schematic diagram are given of a coincidence spectrometer which employs two scintillation spectrometers. The procedure is to select a certain energy range from one spectrometer by means of a single-channel pulse analyzer and to feed the coincident pulses from the second spectrometer into a multi-channel analyzer. A certain γ or β ray is separated more or less completely by the single-channel analyzer and the coincidence spectrum from the multi-channel analyzer then shows which rays are coincident with the chosen radiation. The decay schemes of I^{131}, Sb^{124}, and Ag^{110} are studied by means of this arrangement and total spectra are given along with coincidence spectra for certain selected energy ranges of the single-channel analyzer. 40 references (L.M.T.)

2375

FADING OF THE LATENT IMAGE OF CHARGED PARTICLES. Pierre Demers, Jacques Lapalme, and Jacques Thouvenin. Can. J. Phys. 31, 295-328(1953) Feb. (In French)

Comparative experiments on fading in various types of emulsions; precise measurements on proton tracks; two new procedures applicable to α particles, the one using a chronometric apparatus, the other the analysis of Th stars; and experiments on the effects of air, humidity, and temperature are described. The relations between grain density, ionization, and time are developed, and a mechanism for the fading, analogous to the Herschel effect, is proposed. (G.Y.)

2376

THE USE OF GEIGER COUNTERS IN X-RAY-DIFFRACTION STUDIES. G. K. Williamson. J. Inst. Metals 81, 152-7 (1953) Feb.

The principles of Geiger counters and their applications to x-ray-diffraction analysis, particularly to metallurgical research, are reviewed, and the relative merits of different methods (films, ion chambers, Geiger counters, and proportional counters) are compared. 39 references. (G.Y.)

MESONS

2377

Rochester Univ.

THE ABSORPTION OF SLOW π^- MESONS IN α-PARTICLES, by A. G. Petschek. Feb. 6, 1953. 37p. (NYO-3712)

On the assumption of central charge-independent two-particle nuclear forces, the wave function $(E+K)^{-2}(bE+K)^{-2}$ with E the binding energy, K the kinetic energy, and b = 5.3

is found to be a better wave function, in the sense of a variational principle, for the α particle than the optimum gaussian. With this wave function, the ratios of the numbers of protons to deuterons to tritons in final states resulting from the absorption of π^- mesons from K shells of mesic He atoms are found to be 1 : 1.3 : 0.7. For reasonable values of the PS(PV) coupling constant, 20% of the absorptions take place directly from the 2p level. The number of high-energy γ rays is less than 1% of the number of non-radiative absorptions. Charge-exchange absorption is energetically forbidden. 21 references. (auth)

2378

MULTIPLE MESON PRODUCTION. D. S. Kothari. Nature 171, 309(1953) Feb. 14.

The theoretical probability of emission of a heavy meson (~1300 m_e) in a collision process is estimated by using the statistical theory developed by Fermi. For energies of the primary particle in the laboratory system of 3.5, 7.0, 11.5, and 16.9 Mc^2 the ratio of the number of heavy mesons to π mesons created is ~$^1/_{17}$, $^1/_{29}$, $^1/_{34}$, and $^1/_{39}$, respectively. The nucleons and the heavy mesons were treated in the non-relativistic approximation, while the π mesons were treated in the extreme-relativistic approximation. (G.Y.)

2379

LIFE-TIME OF μ-MESONS. B. V. Sreekantan. Proc. Indian Acad. Sci. 36, 289-98(1952) Oct.

The disintegration curves of μ^+ mesons at rest in two absorbers, Pb and paraffin, have been determined experimentally by an oscilloscopic method using cosmic-ray mesons at sea level as the source of μ-mesons. The mean life time for μ^+ mesons in Pb is 2.24 ± 0.17 μsec and in paraffin 2.24 ± 0.15 μsec. A description of the equipment built for this experiment is given. (auth)

2380

FURTHER MEASUREMENTS OF THE IONIZATION BY ENERGETIC COSMIC-RAY μ-MESONS. B. T. Price, D. West, J. Backer, P. Chanson, E. Nageotte, and P. Treille. Proc. Phys. Soc. (London) A66, 167-72(1953) Feb. 1.

The most probable specific ionization of energetic μ mesons has been measured as a function of momentum, using proportional counters filled with a neon-methane mixture. The results confirm previous measurements, and are in good agreement with the theoretically predicted increase of specific ionization at high momenta. (auth)

2381

ELECTRONS EJECTED IN THE CAPTURE OF μ MESONS BY ATOMIC LEVELS. B. L. Ioffe and I. Ya. Pomeranchuk. Zhur. Eksptl'. i Teoret. Fiz. 23, 123-4(1952) July. (In Russian)

No appreciable number of electrons associated with atomic capture of negative μ mesons by light elements have been observed in nuclear emulsions. Consideration of available energy in associated electron transitions show that this is to be expected. (G.Y.)

NEUTRONS

2382

Chalk River Project (Canada)

CROSS SECTION MEASUREMENTS OF REACTIONS INDUCED BY NEUTRONS OF 14.5 MEV. ENERGY, by E. B. Paul and R. L. Clarke. [nd] 27p. (CRP-527)

The activation cross sections were measured for 57 elements bombarded with 14.5-Mev neutrons from the $T^3(d,n)He^4$ reaction. 38 (n,p), 25 (n,α), and 34 (n,2n) reactions resulting in known radioactive products with half lives between a few seconds and a few days were observed. The counting arrangement was calibrated using samples containing standardized quantities of radioactive materials. The neutron monitor was calibrated by counting the α particles from the $T^3(d,n)He^4$ reaction. Calculations were made of the cross sections predicted by evaporation theory and compared with the observed values. For the charged-particle reactions with mass number greater than 100, the theoretical cross sections were too small. Values of $\sigma_{obs}/\sigma_{cal}$ as high as 10,000 were obtained. However, the predicted cross sections for the (n,2n) reactions were in general agreement with the observed values. A possible interpretation of these results is discussed. (auth)

NUCLEAR PHYSICS

2383

Los Alamos Scientific Lab.

THEORY OF ALPHA-DECAY, by Joseph J. Devaney. Dec. 30, 1952. 29p. (LA-1506)

A preliminary report on the application of the perturbation of boundary conditions theory of Feshback, Weisskopf, and Peaslee (Phys. Rev. 71, 145(1947)) to the problem of the decay of a virtual state is presented. In particular, the formulas for α decay are derived. The derivation assumes no model of the nucleus nor of nuclear forces. Its principal assumption is that the slope of the logarithmic derivative of the wave function vs. energy at the virtual state is given by the average slope close to the energy of that state. This assumption is most general, and in particular includes earlier theories as special cases. (auth)

2384

THE TENSOR FORCE INTERACTION BETWEEN A SHELL CLOSED EXCEPT FOR A SINGLE VACANCY AND AN EXTERNAL NUCLEON. J. Hope. Phys. Rev. 89, 884-5 (1953) Feb. 15.

This note is concerned with the interaction between two configurations both of which contain a group of $4(2l_1 + 1)-1$ equivalent nucleons of orbital momentum l_1 (almost closed shell) and both of which contain an external nucleon, but this is of orbital momentum l_2 in the one configuration and l_2' in the other. The results are given for all of the neutral, symmetric, and charged isotopic spin dependencies. (auth)

2385

PRODUCTION OF POLARIZED PARTICLES IN NUCLEAR REACTIONS. A. Simon and T. A. Welton. Phys. Rev. 89, 886(1953) Feb. 15.

It is pointed out that Schwinger's results (Phys. Rev. 69, 681(1946)), showing that polarized neutrons may be obtained by the elastic scattering of neutrons from He^4, is a special case of a more general theorem to the effect that, under suitable conditions, the products of any nuclear reaction are polarized. A general expression is developed for the polarization resulting from nuclear reactions, specifically the dependence of the intensity of polarization upon the angle between the incident and emitted beam. (L.M.T.)

2386

ISOTOPIC SPIN AND COULOMB FORCES. L. A. Radicati. Proc. Phys. Soc. (London) A66, 139-44(1953) Feb. 1.

The importance of the coulomb forces in mixing states with a different isotopic spin T is investigated assuming charge independence of the specific nuclear forces. It is found that for two and four nucleons outside a closed shell in the state T = 0 this mixing is very small (less than 0.25%, taking into account interconfigurational mixing). It can therefore be concluded that the coulomb forces have very little importance in destroying the validity of the isotopic spin selection rules for β and γ transitions and for collisions, which result from the assumption of the charge independence of nuclear forces. (auth)

NUCLEAR PROPERTIES

2387

Brookhaven National Lab.

A NEUTRON DIFFRACTION STUDY OF MAGNESIUM

FERRITE, by L. M. Corliss and J. M. Hastings, Brookhaven National Lab. and F. G. Brockman, Philips Labs., Inc. [nd] 27p. (BNL-1355)

Neutron-diffraction patterns have been obtained for polycrystalline Mg ferrite. Application of a suitably oriented strong magnetic field has made possible a separation of the coherent scattering into its nuclear and magnetic parts. The magnetic scattering is found to be in good agreement with the Néel model of ferrimagnetism. The form factor for the magnetic scattering is found to be, within experimental error, identical with that previously obtained in the case of Ni ferrite. Analysis of the nuclear scattering permits a simultaneous determination of the degree of inversion, which for the specimen used was 0.88 ± 0.01, and the u space-group parameter to which the value 0.381 ± 0.001 was assigned. (auth)

2388

Research Lab. of Electronics, Mass. Inst. of Tech. TECHNICAL REPORT NO. 224 [ON] THE NUCLEAR MAGNETIC MOMENT OF S^{33} FROM MICROWAVE SPECTROSCOPY, by J. R. Eshbach, R. E. Hillger, and M. W. P. Strandberg. Dec. 20, 1951. 19p. (NP-4368; Tech. Report No. 224; U-24932)

The magnetic dipole moment of the S^{33} nucleus was determined by means of the Zeeman effect on the hyperfine pattern of the $J = 1 \rightarrow 2$ rotational absorption of the molecule $O^{16}C^{12}S^{33}$ at about 24,020 Mc. The result is $\mu(S^{33}) = +0.633 \pm 0.010$ n.m. The sign of this moment was determined by using circularly polarized microwave radiation with σ-type Zeeman observations. The frequencies of all of the components of the hyperfine pattern were measured. They all fit the nuclear electric quadrupole coupling theory to within ±0.01 Mc. The measured value for eqQ of the S^{33} nucleus in $O^{16}C^{12}S^{33}$ is $eqQ(O^{16}C^{12}S^{33}) = -29.07 \pm 0.01$ Mc. 23 references. (auth)

2389

EXCHANGE MAGNETIC MOMENTS OF NUCLEI WITH ALMOST CLOSED SHELLS OF NUCLEONS. Richard W. Cole. Phys. Rev. 89, 883-4(1953) Feb. 15.

The exchange contribution to the measured magnetic moments which has been observed for H^3 and He^3 was investigated for heavier nuclei. The M_σ exchange moments of 4 "closed shell (±1) nuclei," N^{15}, O^{17}, F^{19}, and K^{39} were calculated using the individual particle model and comparison is made with the measured moments. Results indicate that more research is necessary before it can be definitely stated that there is an exchange contribution to the magnetic moments of heavier nuclei. (L.M.T.)

2390

NUCLEAR MAGNETIC RESONANCE OF ALIGNED RADIOACTIVE NUCLEI. N. Bloembergen and G. M. Temmer. Phys. Rev. 89, 883(1953) Feb. 15.

An experiment is proposed where the minimum number of aligned radioactive nuclei necessary to detect magnetic resonance is not determined by the signal-to-noise ratio of r-f equipment, but solely by the statistics of the counters monitoring the radioactive decay. When an r-f field of a few gauss amplitude is applied at the resonance frequency of the nuclei, transitions are induced at the rate of 10^4 or 10^5 per sec and the anisotropy of the radiation rapidly drops. The proposed method for determining this frequency is based upon a heating effect, as in Gorter's original proposal of magnetic resonance (Physica 3, 995(1936)). The crystal at very low temperatures constitutes a very sensitive calorimeter, the radioactive anisotropy serving as the appropriate thermometer. (L.M.T.)

2391

MEASUREMENT OF THE HALF-LIVES OF AcC'', Cu^{66}, Mg^{27}, Tl^{51}, Tl^{206} AND V^{52}. B. W. Sargent, L. Yaffe, and A. P. Gray. Can. J. Phys. 31, 235-49(1953) Feb.

With the exception of AcC'', which was collected by recoil, the radionuclides were produced by irradiating 'spec.-pure' metals or oxides with neutrons in the NRX reactor. The β activities were measured by the rate of deflection of a quartz fiber in an electroscope of recent design. The residual activities were carefully analyzed and eliminated from the main activities by subtraction. Half lives were determined by the method of least squares. In the case of Cu, the effect of the positrons and negatrons from Cu^{64} was suppressed with an Al absorber. The following values were found for the half lives: AcC'', 4.79 ± 0.02; Cu^{66}, 5.10 ± 0.02; Mg^{27}, 9.45 ± 0.04; Ti^{51}, 5.79 ± 0.03; Tl^{206}, 4.19 ± 0.02; and V^{52}, 3.76 ± 0.02 min. The half life found for Cu^{66} from the measurements with the electroscope was confirmed in some measurements with a proportional counter and scale of 1000. 40 references. (auth)

2392

THE ANGULAR DISTRIBUTION OF GAMMA RAYS IN THE $C^{12}(p,p'\gamma)$ REACTION. H. E. Gove and N. S. Wall. Can. J. Phys. 31, 189-93(1953) Feb.

Protons of 7.1 Mev energy from the MIT cyclotron have been used to investigate the angular distribution of γ rays from the $C^{12}(p,p'\gamma)$ reaction with respect to the incoming proton beam. These γ rays result from transitions between the first excited state of C^{12} at 4.45 Mev and the ground state. The resulting distribution can be fitted by the expansion $I(\theta) = 1 - 0.31 \cos 4\theta$ which is consistent with an assignment of two for the angular momentum of the first excited state of C^{12}. 16 references. (auth)

2393

NUCLEAR QUADRUPOLE RESONANCE OF $HgCl_2$. André Bassompierre. Compt. rend. 236, 596-8(1953) Feb. 9. (In French)

The hamiltonian of the interaction between the two electrons of the Hg–Cl bond and the nuclear quadrupole moment of Hg is derived and is then integrated from the fine structure of the Hg spectrum. (G.Y.)

2394

NUCLEAR MAGNETIC RESONANCE MULTIPLETS IN LIQUIDS. H. S. Gutowsky, D. W. McCall, and C. P. Slichter. J. Chem. Phys. 21, 279-92(1953) Feb.

Multiple magnetic resonance lines have been observed for H^1, F^{19}, and P^{31} nuclei in compounds such as PH_3, PF_3, $F_2PO(OH)$, and BrF_5, in the liquid state. The multiplets consisted of two to seven equally spaced narrow components, symmetrically placed about a central frequency, and with splittings from 0.02 to 0.8 gauss. These multiplets arise from a new variety of interaction among the nuclear moments in a molecule. Resonance lines were found to be multiple either when a nucleus interacted with a different species of nucleus or when there was interaction between nuclei of the same species with resonance frequencies separated by a chemical shift. No compounds exhibited multiplets attributable to interactions among structurally equivalent nuclei. Nor were multiplets caused by nuclei whose electric quadrupole moments were coupled to a direction fixed in the molecule. The number and relative intensities of the components of a multiplet were determined by the number and statistical weights of the various nuclear spin orientations of the nuclei causing the splitting. (auth)

NUCLEAR REACTORS

2395

North American Aviation, Inc. SOME THEORETICAL CONSIDERATIONS REGARDING THE PRODUCTION OF FISSIONABLE ISOTOPES IN A THERMAL REACTOR, by L. B. Robinson. Dec. 24, 1952. 16p. (NAA-SR-212)

Differential equations representing isotopic production

and decay schemes are discussed. The Bateman equations are suitable for the description of naturally occurring processes. Van Wye and Beckerley have given equations which describe processes occurring in a thermal reactor, if feedback is neglected. Their equations are modified so that feedback might be included. Examples are given which show the role and the origin of feedback. In a conversion reactor the phenomenon of resonance capture and the operation of the reactor at criticality are responsible for feedback. An example is also given of the appearance of feedback resulting from the production of Pu^{239} from neutron capture by U^{235} and neutron capture by and β decay of Pu^{239} products. This latter example is of more use conceptually than practically. A method of accounting for fuel replacements is also discussed. Some special systems may be treated as general dynamical systems; a method is shown which will determine whether they are conservative or nonconservative. Such information is of both practical and theoretical importance. (auth)

2396

Joint Establishment for Nuclear Energy Research (Norway)
PHOTO-NEUTRONS IN HEAVY WATER FROM URANIUM FISSION PRODUCTS, by N. Holt and A. Lundby. [nd] 6p. (NP-4403; Jener Report No. 11)

The main source of the background flux of neutrons in the JEEP after shut down has been found to be due to photoneutrons released in deuterium by a 2.5-Mev γ ray accompanying the decay of La^{140} which is in transient equilibrium with the 12.8-day Ba^{140} (fission yield 6%). (auth)

2397

Oak Ridge National Lab., Y-12 Area
NUMERICAL INTEGRATION OF DIFFERENTIAL EQUATIONS: MULTI-POINT BOUNDARY PROBLEMS, by R. R. Coveyou. Aug. 20, 1951. 4p. (Y-F10-69)

In the numerical integration of multi-point boundary value problems in the age-diffusion equation of reactor theory, the major difficulty encountered is that the starting values for the integration are not uniquely determined by boundary conditions at the origin. In this note a technique is given for adjusting the obtained solution so as to meet all boundary conditions. (L.M.T.)

2398

AN EXPERIMENTAL STUDY OF A DIVERGENT NUCLEAR REACTOR. J. G. Bayly. Can. J. Phys. 31, 182-8(1953) Feb.

Experimental measurements of the relaxation times of a nuclear reactor were compared with the theoretical relaxation times in the range 1.6 to 186 sec. The work was done with the Chalk River ZEEP, in 1947, and showed that agreement within the experimental error could be obtained if the theoretical model used to represent the reactor was of the age-velocity type with a correction for the effect of the reflector. (auth)

NUCLEAR TRANSFORMATION

2399

Brookhaven National Lab.
NEUTRON DEFICIENT ISOTOPES OF Hg, by K. Gopalakrishnan and A. de-Shalit, Palmer Physical Lab., Princeton Univ. and J. W. Mihelich, Brookhaven National Lab. [nd] 1p. (BNL-1290)

A study of Hg^{195} and Hg^{193} was undertaken in order to look for a possible "family" of similar decay schemes. The isotopes were prepared by bombarding an Au target with high-energy protons. The Hg was then separated carrier-free and studied in a high-resolution double-focusing spectrometer at the Palmer Laboratory and in the permanent-magnet spectrograph at Brookhaven National Lab. An isomeric state in Hg^{195} (38 h) decays via two γ's (123 and 37 kev) to the ground state of Hg^{195} and also by a K capture to an isomeric state in Au^{195} which decays via two γ's (57 and 262 kev) to the ground state of Au^{195}. The situation in Hg^{193} is similar, the respective γ's being 102 and 39 kev in Hg (10 h) and 32, 258, and 120 kev in Au. The half life of Hg^{193} in the ground state is 27 h. (Entire report)

2400

EXCITATION FUNCTIONS FOR THE (γp) AND (γT) REACTIONS IN LITHIUM-7 FOR ENERGIES UP TO 24 MEV. E. W. Titterton and T. A. Brinkley. Proc. Phys. Soc. (London) A66, 194-5(1953) Feb. 1.

Ilford type E1 emulsions, 200 μ thick and loaded with Li_2SO_4, were exposed to 24-Mev bremsstrahlung and were processed to obtain good low-energy discrimination between particles of charges one and two. In all, 338 complete (γ,t) events and 118 complete (γ,p) events were found. Four peaks suggestive of the resonance absorption of γ rays at energies corresponding to levels of the Li^7 nucleus each leading to disintegration into an α particle and triton were found on the number-energy histogram of the (γ,t) events. The first of these at 9.3 Mev is clearly resolved, the others at 16.7, 21.5, and 23.5 Mev are not so certain. This behavior is suggestive of the formation of a compound nucleus. For the (γ,p) reaction, although some scatter of points may be due to unresolved fine structure, only the drawing of a smooth curve showing the general trend of the cross section as a function of energy could be justified by the statistics of the experiment. (G.Y.)

2401

EMISSION OF HIGH-ENERGY γ QUANTA IN THE COLLISION OF FAST NEUTRONS WITH PROTONS. I. Ya. Pomeranchuk and I. M. Shmushkevich. Doklady Akad. Nauk S.S.S.R. 87, 385-7(1952) Nov. 21. (In Russian)

An expression for the cross section of the $p + n \rightarrow \gamma + d$ reaction for high-energy (200 to 250 Mev) nucleons is derived in relation to the cross section for deuterium photofission. The ensuing γ spectrum is compared with the π-meson spectrum arising from the collision of two nucleons. (G.Y.)

2402

EFFECT OF THE COULOMB FIELD ON THE ANGULAR DISTRIBUTION OF (d,n) REACTIONS. Jean Yoccoz. Compt. rend. 236, 587-9(1953) Feb. 9. (In French)

The effect is demonstrated by a modification of that part of the wave function describing the incident deuteron. For (d,p) reactions the wave function of the emerging proton also must be modified, but this modification is weak compared to the first. Integration of the factors determining the angular distribution has been carried out; numerical results are to be communicated in a later publication. (G.Y.)

2403

THE PHOTONEUTRON CROSS SECTIONS OF Rb^{87}, Zr^{90}, AND Mo^{92}. L. Katz, R. G. Baker, and R. Montalbetti. Can. J. Phys. 31, 250-61(1953) Feb.

The photoneutron cross sections of the 50-neutron isotopes Rb^{87}, Zr^{90}, and Mo^{92} have been measured as a function of photon energy. These cross sections exhibit the peaked shape characteristic of photonuclear reactions. Peak values of 0.23, 0.27, and 0.14 b at 17.5, 18.0, and 18.7 Mev, respectively, were found for these nuclei. The widths of all the curves at half maximum were about 6 Mev. In the case of Zr and Mo the cross sections to the isomeric and ground states of the residual nuclei have been determined separately. The ratio of the cross sections, $\sigma_{ground}/\sigma_{isomeric}$, has been examined as a function of photon energy and is discussed in the light of the elementary analysis previously presented. 23 references. (auth)

2404

CROSS SECTION FOR THE REACTION $Be^9(\gamma,p)Li^8$. R. N. H. Haslam, L. Katz, E. H. Crosby, R. G. Summers-Gill,

and A. G. W. Cameron. Can. J. Phys. 31, 210-17(1953) Feb.

The reaction $Be^9(\gamma,p)Li^8$ has been investigated by detecting the 0.88-sec. Li^8 β activity, by the use of a cycling apparatus which allows intermittent operation of the betatron, counting taking place during the periods of no x-ray yield. The cross section for the reaction has a peak value of 2.72 mb at 22.2 Mev a half width of 4.7 Mev, and the integrated cross section to 26 Mev is 0.013 Mev-barns. 16 references. (auth)

2405

PHOTO-ALPHA PARTICLES FROM SILVER AND BROMINE IRRADIATED WITH 70 MEV. BREMSSTRAHLUNG. Chas. H. Millar. Can. J. Phys. 31, 262-6(1953) Feb.

The energy spectrum of the α particles ejected from Ag and Br nuclei has been studied in a nuclear research emulsion irradiated with 70-Mev bremsstrahlung from the Queen's University synchrotron. The main feature of the observed spectrum is a broad group with a peak at about 11 Mev. Evidence for particles of energies less than 6 Mev is inconclusive. Calculations have been made on the basis of the nuclear evaporation theory and give a predicted spectrum which is consistent in shape and peak position with the observed results. (auth)

2406

ENERGY LEVELS IN LEAD AND BISMUTH AND NUCLEAR SHELL STRUCTURE. John A. Harvey. Can. J. Phys. 31, 278-94(1953) Feb.

A Bi target and Pb targets enriched in Pb^{206}, Pb^{207}, and Pb^{208} have been bombarded with 14-Mev deuterons from the M.I.T. cyclotron. Proton and triton spectra were measured with Al absorbers and a triple proportional counter. The spectra have been carefully analyzed and resolved into a relatively small number of groups. The proton spectra from all four targets are very similar, except for the long-range-state groups from the Pb^{206} and Pb^{207} targets. A striking similarity also occurs among the triton spectra from the four targets. The simplicity in the spectra probably arises because we are dealing with residual nuclei with closed or nearly closed shells of 82 protons and 126 neutrons. The fact that a (d,p) reaction proceeds mainly by means of a stripping process, in which only the neutron enters the nucleus, suggests the possibility that the similarities can be explained by a single particle model of the nucleus. Moreover, the (d,t) reaction is principally a pick-up process and thus the single-particle model is suggested again. Observed energy levels are compared with the known levels measured from radiative transitions. Aided by the angular momentum and parity assignments of some of these known levels, tentative assignments of angular momentum and parity are made to many of the new levels from a strong spin-orbit coupling shell model. 35 references. (auth)

2407

ISOMERIC BRANCHING AND THRESHOLD BEHAVIOR OF THE REACTION $Mo^{92}(n,2n)Mo^{91}$. John E. Brolley, Jr. Phys. Rev. 89, 877(1953) Feb 15.

Another search was made for the 65-sec Mo^{91} activity from the $Mo^{92}(n,2n)$ reaction inasmuch as various investigators report it along with the 15.5-min Mo^{91} activity produced by the $Mo^{92}(\gamma,n)$ reaction. Two- and 15.5-min bombardments with 14.4-Mev neutrons produced no measurable trace of the short half life, but a weak activity was found when 18-Mev neutrons were used. It was noted that 14.5-Mev γ rays give a value of ~0.2 for the ratio of the 65.5-sec to the 15.5-min photo cross sections. Data are given from the measurement of a number of relative cross-section values for the 15.5-min isomer. (L.M.T.)

2408

ANGULAR CORRELATION IN THE DECAY OF Li^8. C. M. Class and S. S. Hanna. Phys. Rev. 89, 877-8(1953) Feb. 15.

The β-α correlation of the $Li^8(\beta)Be^{8*}(\alpha)He^4$ reaction was examined. Li^8 was produced by bombarding Li^7 with 0.65-Mev deuterons. Alpha particles were detected by means of a thin, 10-mil, NaI crystal mounted at 90° to the deuteron beam, and coupled to a photomultiplier tube. Beta particles were detected with a NaI crystal and a photomultiplier tube free to rotate about the source. The pulses from each counter were amplified and passed through a discriminator, giving either a differential or an integral counting rate, and then to the coincidence detector. Data include differential pulse-height spectra, β-α angular correlations for various portions of the upper part of the β continuum, and the ratio of yields at 0° and 90° for various portions of the upper part of the β spectrum. (L.M.T.)

2409

RADIATIVE CAPTURE OF A FAST NEUTRON IN HYDROGEN. A. M. Korolev. Zhur. Eksptl'. i Teoret. Fiz. 23, 3-7 (1952) July. (In Russian)

The lower limit of the cross section for emission of a γ quantum in the collision of fast neutrons with protons is evaluated with calculation of the neutron-proton interaction in the final states. It is shown that at high neutron energies the process of radiative scattering predominates over the process of radiative capture of nucleons forming deuterons. In the energy region ~340 Mev the cross section is $\sim 10^{-28}$ cm^2. (tr-auth)

PARTICLE ACCELERATORS

2410

Brookhaven National Lab.

NOTES ON THE HIGH ENERGY ACCELERATOR CONFERENCE [ON] DECEMBER 16-17, 1952, by M. Hildred Blewett. Jan. 1953. 32p. (BNL-213)

An informal report is presented of the high-energy accelerator conference held in conjunction with the Cosmotron dedication ceremonies at Brookhaven National Lab., Dec. 16 and 17, 1952. On the first day the talks were devoted to descriptions and proposed modifications of existing machines, grouping the talks according to the following machine species: f-m cyclotrons, linear accelerators, and sychrotrons (proton and electron). On the second day the present state of theory and design proposals were presented for the new alternating-field-gradient types of synchrotrons and linear accelerators. (L.M.T.)

2411

A HEAVY-PARTICLE ACCELERATOR. J. W. Gallop. Nature 171, 306-7(1953) Feb. 14.

A solution to the problem of the defocusing effect of the electromagnetic wave in the Walkinshaw helix heavy-particle accelerator (NSA 5-2926) is proposed. This is the introduction of a constant magnetic field gradient across the helical guide, the axis of which should then be made to take the form of a spiral in the plane perpendicular to the magnetic field, the dimensions depending on the magnetic field strength and the rate of acceleration. (G.Y.)

2412

TRAVELLING-WAVE LINEAR ACCELERATOR FOR X-RAY THERAPY. C. W. Miller. Nature 171, 297-8(1953) Feb. 14.

A linear electron accelerator with a design energy of 10 Mev is described briefly, and details of its performance as an x-ray generator are presented. An output of up to 1250 r/min has been obtained. (G.Y.)

2413

THE INITIAL PERFORMANCE OF A PROTON ACCELERATOR TUBE; DETERIORATION AND ITS CAUSES. D. R. Chick and F. J. Miranda. J. Sci. Instruments 29, 340-1 (1952) Oct.

Observations on the initial performance of a proton accelerator tube and subsequent deterioration are presented.

Damage caused by voltage breakdown in the vacuum and lowering of the breakdown voltage after operation are described. Proposals are made concerning design changes to overcome these operational difficulties. (L.T.W.)

RADIATION ABSORPTION AND SCATTERING

2414

A TEST FOR CHARGE INDEPENDENCE IN HIGH ENERGY NUCLEON-NUCLEON SCATTERING. B. A. Jacobsohn. Phys. Rev. 89, 881-2(1953) Feb.

In a paper on high energy proton-proton scattering, Chamberlain et al. (Phys. Rev. 83, 923(1953)) mention the inequality, $\sigma_{pp}(90°) \leq 4\,\sigma_{np}(90°)$, as one which must hold if charge-independent central forces act between two nucleons. The purpose of this letter is to point out that the inequality holds under much less restrictive conditions and is, in fact, a direct consequence of the assumptions of charge independence and parity conservation for the nucleon-nucleon interaction. (auth)

2415

ANGULAR SEPARATION OF ELECTRON PAIRS. I. B. McDiarmid. Can. J. Phys. 31, 337-8(1953) Feb.

A scattering method was used to determine the energies of electron pairs produced by 0 to 70-Mev x rays in G-5 emulsions (Can. J. Phys. 30, 670(1952)). This note gives the mean projected angle between members of a pair and the distribution of these angles as a function of the pair energy. (auth)

RADIATION EFFECTS

2416

Illinois Univ.

PROGRESS REPORT NO. 3 [ON RADIATION DAMAGE AND RECOVERY], by J. S. Koehler. Feb. 1, 1953. 7p. (COO-97; Progress Report No. 3)

An experiment to quench-in lattice vacancies in Au was successful (See Phys. Rev. 88, 149-50(1952)). At present measurements are under way to determine the energy required to produce a lattice vacancy, the energy required for motion of a lattice vacancy, and the mean number of atomic distances the vacancy can move through before it disappears. The isothermal annealing effects in irradiated Cu is also reported (cf. AECU-2358). (L.M.T.)

2417

RADIATION DAMAGE OF BETA-BRASS. R. R. Eggleston and F. E. Bowman. J. Applied Phys. 24, 229-30(1953) Feb.

Two β-brass foil specimens, 5 mil thick, were irradiated with 33.0-Mev α particles from a cyclotron and were held below $-100°$C throughout the bombardment. At intervals throughout the irradiation the bombardment was stopped and the specimen resistance measured at the base temp. of $-146°$C. After an irradiation of 23 μa-hr/cm^2, the specimens were annealed by "pulsing" them for 5 min at successively higher temperatures but were returned to the base temp. for a resistance measurement between each pulse. Plots show an unusually large percentage resistivity increase in the specimen but also that the induced damage anneals out very rapidly at low temperatures. It is suggested that the observed changes may be due to the brass being transformed to the disordered state by the α-particle bombardment. (L.M.T.)

2418

INDUCED THERMOELECTRIC POTENTIAL FROM RADIATION DAMAGE. Alan Andrew and Clifton R. Davidson. Phys. Rev. 89, 876-7(1953) Feb. 15.

The effect of radiation damage on the thermoelectric potential of Fe and constantan has been remeasured at lower temperatures. A 5-mil wire was wound on a mica form and the central portion exposed to 10-Mev protons, the two end sections being shielded from the beam. The wire was maintained below 0°C throughout the irradiation. After irradiation the wire was unwound and annealed at various temperatures for an hour in a specially designed furnace, the reference junction being held at 0°C. After each anneal the thermoelectric potential of the irradiated section was measured against the unirradiated section. From the 2 plots it is seen that the maximum induced thermoelectric potentials are 0.3 μv/0°C for Fe and 0.1 μv/0°C for constantan. (L.M.T.)

2419

THE LUMINESCENCE OF AIR, GLASS AND QUARTZ UNDER α-PARTICLE IRRADIATION. J. B. Birks and J. W. King. Proc. Phys. Soc. (London) B66, 81-4(1953) Feb. 1.

The luminosity of a Po^{210} source has been detected using a photomultiplier technique. It is also found that photons are produced in air, glass, and quartz when these materials are irradiated by α particles. It is shown that the "scintillations" observed by Richards and Cole (NSA 5-1969) probably originated in these materials, and not in the various thin films to which they were ascribed.

2420

AN INVESTIGATION OF THE THERMOLUMINESCENCE OF FLUORITE COLORED BY X-RAY IRRADIATION. John J. Hill and Jack Aron. J. Chem. Phys. 21, 223-8(1953) Feb.

The thermoluminescence resulting when CaF_2 crystals colored by x irradiation are heated has been investigated in the region 3200 to 6500 A. First, the form of the emission spectrum was determined by the use of a spectrophotometer in conjunction with a photomultiplier tube as a detector, and 15 emission bands were observed of which seven weak ones had not previously been reported. The peaks of these bands occurred at 3430, 3650, 3710, 3790, 3810, 4150, 4270, 4370, 4570, 4780, 4890, 5230, 5350, 5430, and 5740 A. Second, continuous annealing curves or "glow curves" were obtained for the strongest emission bands by raising the temperature of the crystal at a constant rate and recording the intensity of the emitted light at the peak of each band. The maxima of the glow curves thus recorded fall into two groups. In group 1, three maxima located at approximately 197, 285, and 310°C were observed. In group 2, five intensity maxima could be distinguished, the lowest occurring at approximately 70°C and the highest at 245°C. The corresponding activation energies were calculated, and in two cases were checked by carrying out the annealing at fixed temperatures. These results are consistent with the assumption that two distinct types of imperfections are responsible for the thermoluminescence of CaF_2. The optical absorption appears to be the result of the imperfections associated with group 2. (auth)

2421

F BANDS IN SOME MIXED CRYSTALS OF THE ALKALI HALIDES. Robert J. Gnaedinger, Jr. J. Chem. Phys. 21, 323-30(1953) Feb.

X-ray-induced F bands in melt-grown mixed crystals of KCl and RbCl were studied. Though no resolution of "component" F bands was obtained at liquid nitrogen temperature, the behavior of the F band parameters as a function of concentration of RbCl in KCl and as a function of temperature is shown to be explainable by postulating the existence of a set of "component" F bands, each arising from an F center with a given composition of positive ions immediately surrounding it. Some studies of other mixed crystals are also mentioned. (auth)

RADIOACTIVITY

2422

Oak Ridge National Lab.

TABLES FOR THE ANALYSIS OF ALLOWED AND FORBIDDEN BETA TRANSITIONS, by M. E. Rose, C. L. Perry,

and Nancy M. Dismuke. Issued Feb. 11, 1953. 376p. (ORNL-1459)

Tables from which the analysis of allowed and forbidden β spectra can be carried out are presented. The values of six combinations of electron radial wave functions are tabulated for even Z in the range $10 \leq Z \leq 96$ for both electron and positron emitters. (L.T.W.)

2423

INVESTIGATION OF TRUE COINCIDENCES OBSERVED DURING DISINTEGRATION OF P^{32}. Maurice Duquesne. Compt. rend. 236, 598-600(1953) Feb. 9. (In French)

Observations on the β particles emitted from opposite sides of a P^{32} source of symmetric geometry showed the presence of coincidences not attributable to backscattering. (G.Y.)

RARE EARTHS AND RARE-EARTH COMPOUNDS

2424

OBSERVATIONS ON THE MAGNETIC PROPERTIES OF METALLIC DYSPROSIUM. Félix Trombe. Compt. rend. 236, 591-3(1953) Feb. 9. (In French)

Values of the magnetic susceptibility of Dy were measured in fields of 4350, 6350, and 7800 gauss and are plotted as a function of temperature. On the same graph is plotted $1/\chi$ for the paramagnetic region. Above 250°K, Dy follows the Curie-Weiss law; from 250 to 178°K it remains paramagnetic but the $1/\chi$ vs. T curve lies slightly below that of the high-temperature extension; below 178°K, the point of magnetic and expansion anomaly, the susceptibility of Dy varies with field intensity in a manner opposite to that observed for ferromagnetics. This phenomenon has a maximum at 178°K and then decreases and disappears between 160 and 153°K. (G.Y.)

SHIELDING

2425

Oak Ridge National Lab.

SUMMARY REPORT ON PORTLAND CEMENT CONCRETES FOR SHIELDING, by R. B. Gallaher and A. S. Kitzes. Issued Mar. 2, 1953. 30p. (ORNL-1414)

Portland cement concretes of medium density have been developed, using a variety of aggregates to impart specific nuclear properties to the finished product. Concretes containing 1% boron as colemanite and 8% water are described, and physical-property data for various concretes are given. Thermal conductivity for barytes concrete was found to be 0.926 Btu/hr-ft-°F at 122°F, 0.997 at 212°, 1.02 at 257°, 0.872 at 302°, 0.866 at 392°, and 0.745 at 482°. The specific heat (Btu/lb-°F) of barytes concrete increased linearly with temperature from 0.123 at 122°F to 0.150 at 392°F. (auth)

SPECTROSCOPY

2426

Carbide and Carbon Chemicals Co. (Y-12)

FAR-ULTRAVIOLET SPECTROSCOPY: A LITERATURE SEARCH, by Frances Sachs. Nov. 29, 1952. Decl. Jan. 29, 1953. 38p. (AECD-3503; Y-920)

A search was made of the literature from 1938 through September 1952 for references on far-ultraviolet spectroscopy. The range checked was from 500 to 2000 A. Eighty-six references, with abstracts for many of them, are presented. (C.R.)

2427

National Bureau of Standards

PROPERTIES OF FLUORINE COMPOUNDS: THE VIBRATIONAL SPECTRUM OF CHLOROTRIFLUOROETHYLENE, by D. E. Mann, National Bureau of Standards and N. Acquista and Earle K. Plyler, Atomic Physics Lab., National Bureau of Standards. Jan. 15, 1953. 18p. (NBS-2155)

The ideal-gas entropy value for chlorotrifluoroethylene (CTFE) at its boiling point, 244.80°K, that is based on the vibrational assignment is about 2.2 e.u. smaller than the value 73.28 e.u. obtained experimentally. The infrared spectrum of CTFE has been reinvestigated in more detail and over a more extensive region, 4000 to 190 cm^{-1}, than in the earlier work. Two hitherto unobserved bands have been found at 369 and 194 cm^{-1}. The investigation under high dispersion of combination bands in the region 1925 to 2000 cm^{-1} has demonstrated the existence of two type C fundamentals at about 200 and 185 cm^{-1}. These data, together with the previously available Raman data, have made possible the achievement of a new and more satisfactory assignment. The entropy value based on the present assignment is 73.29 e.u. (auth)

2428

A DESCRIPTION OF A LARGE DOUBLE-FOCUSING BETA SPECTROMETER AND ITS APPLICATION TO A STUDY OF THE DECAY OF In^{114}. M. W. Johns, H. Waterman, D. MacAskill, and C. D. Cox. Can. J. Phys. 31, 225-34(1953) Feb.

The design and performance of a Siegbahn-type double-focusing β spectrometer of radius of curvature 50 cm are described. It has a resolution of 0.3% with a transmission of a few tenths of a per cent. A study of the decay of In^{114} has revealed γ-rays in the K-capture branch of energies 0.556, 0.576, 0.722, 1.271, and 1.300 Mev. These define excited levels in Cd^{114} of energies 0.556, 1.278, and 1.856 Mev above the ground state. The end point of the β^- spectrum is at 1.984 ± 0.004 Mev. 17 references. (auth)

THEORETICAL PHYSICS

2429

Solid-State and Molecular Theory Group, Mass. Inst. of Tech.

QUARTERLY PROGRESS REPORT NO. 7. Jan. 15, 1953. 56p. (NP-4332; Quarterly Progress Report No. 7; U-26128)

Research comprised studies of atomic and molecular energy levels by a generalized self-consistent field method, the H_2O molecule, theory of molecular O, configuration interaction in HF, theory of the S_8 molecule, nuclear electric quadrupole interaction in the KCl molecule, energy bands in Cr, a simple model of ferromagnetism, the equivalence of electrons and holes, theory of ferromagnetism, antiferromagnetism, the local field in a crystal lattice, and electric-field gradient at nuclei of molecules. (cf. TIP U24875) (TID-LC)

2430

RELATIVISTIC CONTRIBUTION TO THE MAGNETIC MOMENT OF $^3S_1$ HELIUM. William Perl and Vernon Hughes. Phys. Rev. 89, 886-7(1953) Feb. 15.

The nonquantum electrodynamic contribution of order $\alpha^2 \sim(137)^{-2}$ to the magnetic moment of He in the lowest energy triplet (metastable) state $^3S_1$ has been calculated. The purpose of the calculation was to isolate to order α^2 the quantum electrodynamic radiative contributions to the magnetic moment of a bound two-electron system, for comparison with experiment. (auth)

2431

THERMODYNAMICS OF SOME SPECIAL FIELDS. R. V. Krotkov and A. E. Scheidegger. Can. J. Phys. 31, 329-36 (1953) Feb.

The free energy, internal energy, and entropy of two quantized fields are calculated, using the method introduced by Scheidegger and McKay (Phys. Rev. 83, 125(1951)). The two fields examined are those representing (a) an ensemble of mesons bound by an interaction with their source (a nucleon), and (b) an ensemble of electrons perturbed by an external electromagnetic field does affect the thermodynamic

functions of the electrons. Explicit formulas in the latter case are given. (auth)

2432

APPROXIMATE WAVE FUNCTIONS FOR UNBOUND RELATIVISTIC PARTICLES IN A COULOMB FIELD. G. K. Horton and R. T. Sharp. Phys. Rev. 89, 885-6(1953) Feb. 15.

It is pointed out that while exact relativistic wave functions describing unbound charged particles moving in a coulomb field are known, they have not proved convenient for actual calculations. In this note the Sommerfield-Maue approximation is used to fill the gap of charge and energy values which cannot be covered by the nonrelativistic Schroedinger equation (for low-energy particles) and the Born approximation (for high energies and low charge). (L.M.T.)

2433

SPIN OF PARTICLES WITH ZERO REST MASS. Yu. M. Shirokov. Zhur. Eksptl'. i Teoret. Fiz. 23, 78-82(1952) July. (In Russian)

It is shown that the covariant spin derivation previously given by the author (NSA 6-457) is also useful as a conservation operator for particles with zero rest mass. In the process of investigating the eigenvalues of the spin operator for these particles, it was made clear that in this particular case the invariant term in $h^2 l\,(l+1)$ is absent and that spin characteristics of the particles completely determine a single pseudoscalar operator which does not have a nonrelativistic analog. (tr-auth)

2434

NOTE ON THE PRODUCTION OF PSEUDOSCALAR MESONS. James McConnell. Proc. Roy. Irish Acad. A55, 101-8(1953) Jan.

The calculations involved in the resolution of the field of the moving nucleon are re-examined. In the calculations by Heitler and Peng (Proc. Roy. Irish Acad. A49, 101(1943)), it was thought that the dependence of the meson spectrum on b, the minimum value of the impact parameter for the nucleon-nucleon collision, was not very strong. It was found, however, that the results depend very much on b. For π mesons having pseudovector coupling with the nucleon, the cross section for meson production by nucleon-nucleon collisions is then calculated as a function of the pseudovector coupling constant, the energy of the incoming nucleon, and the minimum value b of the impact parameter. 13 references. (L.M.T.)

2435

A NEW QUATERNION APPROACH TO MESON THEORY. C. W. Kilmister. Proc. Roy. Irish Acad. A55, 73-99(1953) Jan.

Conway (Proc. Roy. Soc. (London) A162, 145(1937)) showed that the field equations of meson theory could be written in quaternion form. The object of this paper is rather different. The general ideas of quaternion algebra are extended to the algebra of E-numbers. It is then possible to extend Eddington's method of deriving Dirac's equations. The resulting wave equation

$$E_\mu \partial_\mu \Psi = \kappa \Psi, \quad \Psi = \pm \Psi^C$$

where Ψ is an E-number, is shown to be equivalent to the field equations for particles of spin 0 to 1. This is, therefore, a new particle formulation of meson theory. It is in some ways more convenient than that using Duffin-Kemmer matrices. In addition, the idea of field-free conditions is carefully analyzed. It is shown that the usual assumptions about the representation of field-free conditions in wave equations are in fact justified, with one exception. 14 references. (auth)

2436

QUANTUM ELECTRODYNAMICS WITH AUXILIARY FIELDS. Suraj N. Gupta. Proc. Phys. Soc. (London) A66, 129-38(1953) Feb. 1.

A consistent scheme of quantum electrodynamics with auxiliary fields of photons and electrons of infinitely large masses is developed. The auxiliary fields are introduced from the very beginning in the lagrangian density, but it is ensured by means of suitable initial conditions that these fields are completely unobservable. For some of the auxiliary photon fields the usual sign of the lagrangian density is reversed, while for some of the auxiliary electrons fields the usual statistics of the field is reversed. For such fields it is found necessary to use an indefinite metric. It is shown that the present treatment provides a well-defined procedure for the evaluation of divergent integrals in quantum electrodynamics. As an application, the self-energy of the photon is evaluated and shown to vanish for a free photon. (auth)

URANIUM AND URANIUM COMPOUNDS

2437

Argonne National Lab.

CALCULATIONS ON U^{235} FISSION PRODUCT DECAY CHAINS, by I. L. Faller, T. S. Chapman, and J. M. West. May 1952. 267p. (ANL-4807)

Calculations are presented on the U^{235} fission-product decay schemes. The results for a typical example, that of a reactor operating at 1000 kw for 180 days, are tabulated and graphed. General formulas are given so that the results can be applied for any power level and any time of irradiation. The decay chains, half-life values, and fission yields were taken chiefly from the National Nuclear Energy Series. The decay chains are enumerated. (auth)

PATENTS

CHEMISTRY

2438

APPARATUS FOR FRACTIONAL SUBLIMATION. A. F. Reid (to U. S. Atomic Energy Commission). U. S. Patent 2,628,892, Feb. 17, 1953.

This apparatus separates the components of a volatile solid mixture by a process involving countercurrent flow of a solid and its vapors. It comprises a helical passage which is rotatable about its axis, together with means for establishing in each operative turn of the helix a hot zone for vaporizing the mixture to be separated and a cold zone for condensing the vaporized material. The helix is rotated so that condensed material may be mechanically moved relative to the hot and cold zones.

2439

PROCESS FOR THE PREPARATION OF FLUOROCARBONS. R. D. Fowler (to U. S. Atomic Energy Commission). U. S. Patent 2,631,170, March 10, 1953.

In the preparation of perfluoro organic compounds, a trifluoride selected from the group consisting of manganese trifluoride and cobalt trifluoride is reacted with a hydrocarbon vapor at a temperature between 150 and 400°C until all the H has been replaced by F.

2440

SEPARATION PROCESS FOR ACTINIUM. F. T. Hagemann (to U. S. Atomic Energy Commission). U. S. Patent 2,632,763, March 24, 1953.

Actinium is separated from a mixture of Ac and Ra by treating the acidic aqueous solution of the two salts at a

pH of about 2.5 to 4.5 with a solution in a nonpolar water-immiscible solvent, such as benzene, of a fluorinated beta-diketone, such as 2-thenoyltrifluoroacetone, and separating the resultant aqueous phase containing the Ra from the immiscible solvent phase containing the Ac chelate compound. The Ac may be extracted from the organic phase by contacting with an acidic aqueous solution having a pH less than 2.5. The same general process may be used to separate Th and Ac by suitably adjusting the acidity of the aqueous acidic solutions.

ENINGEERING

2441

SHIELDED SWITCH ASSEMBLY. C. T. Grauer (to U. S. Atomic Energy Commission). U. S. Patent 2,628,297, Feb. 10, 1953.

This magnetically operated flow switch for use in the presence of a strong disturbing magnetic field employs a ferromagnetic shield in the region of the magnetic control elements and coils to establish a magnetic flux either alternating or opposed to the disturbing field.

2442

FLOW VALVE CONTROL. N. S. Herod and L. R. O'Neill (to U. S. Atomic Energy Commission). U. S. Patent 2,628,638, Feb. 17, 1953.

This flow control valve is capable of minute adjustment by a frictional plate clutch arranged between coarse and fine controls. The valve employs a novel replaceable valve seat and insert and is particularly useful in handling corrosive gases moving at low velocity.

2443

FILTER. R. P. Hammond and J. A. Leary (to U. S. Atomic Energy Commission). U. S. Patent 2,629,459, Feb. 24, 1953.

This filter removes particulate matter from a gas stream which is saturated with vapor such as water vapor. It comprises a pad of glass fibers having a diameter ~0.004 in. packed, in essentially random orientation, to a bulk density between ~0.1 and 0.6 lb/ft^3.

2444

MIST FILTER. D. L. Hopper and H. E. Criner (to U. S. Atomic Energy Commission). U. S. Patent 2,630,878, March 10, 1953.

In this filter of small size and large capacity a Venturi tube between two expansion chambers carries a fibrous material and operates with only a moderate pressure drop to remove particles such as oil mist from gases.

2445

REMOTE CONTROL MANIPULATOR. R. C. Goertz (to U. S. Atomic Energy Commission). U. S. Patent 2,632,574, March 24, 1953.

This straight arm manipulator comprises a horizontal tube having tongs or jaws attached to one end of the tube and a manipulating handle attached to the other end, with connecting means for transferring motion from the manipulating handle to the tongs disposed compactly in the tube. The device may be modified by attaching vertical shafts of desired length to either or both ends of the horizontal tube. The design provides freedom of motion in three dimensions.

PHYSICS

2446

COMPARATIVE PHOTOMETER. A. A. Brown (to U. S. Atomic Energy Commission). U. S. Patent 2,626,989, Jan. 27, 1953.

In this method and apparatus for producing relative motion between a comparative-photometry assembly and the objects to be scanned, a combination of electronic photometric apparatus, mechanical apparatus, and photographic images is useful in the simple and rapid production of comparative photographs.

2447

AMPLIFIER CIRCUIT FOR TESTING. Q. A. Kerns (to U. S. Atomic Energy Commission). U. S. Patent 2,628,268, Feb. 10, 1953.

Electronic circuitry for automatically determining the current-voltage characteristics of an electrical device is described. The arrangement provides an input circuit for an amplifier having a negative feedback circuit whereby the input is distorted a minimum amount at the output.

2448

PORTABLE VOLTAGE SUPPLY FOR RADIATION COUNTERS. C. D. Gould (to U. S. Atomic Energy Commission). U. S. Patent 2,628,338, Feb. 10, 1953.

This portable adjustable high-voltage power supply for use in connection with a Geiger-tube radiation-measuring instrument makes use of a manually wound spring-powered generator and is used to recharge the capacitor power supply of the Geiger tube as needed.

2449

RADIOACTIVE RESISTOR. J. M. Benade, E. E. Goodale, and W. P. Jesse (to U. S. Atomic Energy Commission). U. S. Patent 2,629,837, Feb. 24, 1953.

A radioactive-type resistor, which does not exhibit any self-induced voltage when no external source of voltage is applied to the electrodes, comprises in part a sealed envelope containing an ionizable gas, a pair of electrodes, radioactive means for effectuating ionization of the gas and a covering of electrically conducting material in contact with a portion of one of the electrodes. This material is of such a nature that the self-induced voltage is of opposite sign and equal magnitude to the self-induced voltage of the electrode with which it is in contact.

2450

TACHOMETER. E. R. Mann and R. G. Hester (to U. S. Atomic Energy Commission). U. S. Patent 2,630,529, March 3, 1953.

This mechanical-electronic-type tachometer produces an output voltage accurately proportional to the speed of a rotating shaft or the like over a wide range of speed.

2451

METHOD OF FORMING COATING CONTAINING URANIUM AND METHOD OF ISOTOPIC ANALYSIS. B. Cohen (to U. S. Atomic Energy Commission). U. S. Patent 2,631,245, March 10, 1953.

A method is described for forming a thin, uniform, adherent coating containing U by electrolytic deposition of substantially all of the U present in a prepared solution. Such a coating is particularly useful in determining the isotopic composition of the U by neutron bombardment and fission-particle counting.

2452

ELECTRICAL APPARATUS AND METHOD. V. C. Wilson and J. A. Simpson (to U. S. Atomic Energy Commission). U. S. Patent 2,633,540, March 24, 1953.

This patent describes an electrical field-reversing circuit, employed in conjunction with a radiation counter tube such as a G-M tube, which speeds up the collection of the positive-ion cloud and thereby decreases the dead time of the counter tube to less than 10^{-5} sec.

$_{57}La^{140}_{83}$

τ 40.2^h La(pile n)

R.M.Bartholomew, F.Brown, R.C.Hawkins, W.F.Merritt, L.Yaffe, Can. J. Chem. 31, 120(1953).

$_{59}Pr^{141}_{82}$

μ 3.8 M

H.Low, Phys. Rev. 89, 530(1953).

$_{64}Gd^{148}_{84}$?

τ >35^y Sm^{147}(32-Mev α)Eu(32-Mev p); ion chem yield; ic

α >25%* 3.2

No 7^h activity found Sm(30-Mev α) ion chem (7.5^{h}At from Bi impurity?)

*Assuming σ(36-Mev α,3n) = 1

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

$_{64}Gd^{149}_{84}$

ϵ Sm^{147}(31-Mev α) not Sm(19-Mev d), ion chem; ic

α ~0.0007% 3.0

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

$_{64}Gd^{150}_{86}$?

α 2.7 Eu(19-Mev d) chem; ic

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

$_{65}Tb^{149}_{84}$

τ 4.1^h Eu(60-Mev α)

ϵ ? Gd(31-Mev p); ion chem

α 3.95

No β^+

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

$_{65}Tb^{151}_{86}$?

τ 19^h Gd(100-Mev p) Eu(45-Mev α)

α >0.0004%* 3.4 ion chem; ic

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953); *W.A.Roller, J.O.Rasmussen, Ibid.

$_{66}Dy^{>149}_{<153}$

τ 19^m Tb(100-Mev p)

α 4.1 not Eu(120-Mev α); ic

τ 2.3^h Tb(100-Mev p); ion chem

α 3.6 Nd(~100-Mev C^{12}); ic

τ 7^m Tb(100-Mev p)

α 4.2 Nd(~100-Mev C^{12}); ic

Not Eu(120-Mev α)

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

Ho ?

τ ~4^m Dy(200-Mev p)

α 4.2 Sm(100-Mev C^{12})? ic

No Ho α activity observed with τ >1^h Er(200-Mev p) Yb(250-Mev p); ion chem

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

Er

No Er α activity observed with τ >1^h Er(200-Mev p) Yb(250-Mev p); ion chem

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

Tm

No Tm α activity observed with τ >1^h Er(200-Mev p) Yb(250-Mev p); ion chem

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

Yb

Neutron resonances (ev) E_n = 0.1 ev to 40 ev

0.597	13.3
4.55	18.2
8.09	30

V.L.Sailor, H.L.Foote, Jr., H.H.Landon, Phys. Rev. 89, 904A(1953).

$_{74}W^{187}_{113}$

τ 23.85^h W(slow n)

G.G.Eichholz, Phys. Rev. 89, 525(1953).

$_{75}Re^{188}_{113}$

τ_1 22^m Re^{187}(pile n)

γ 0.0635 s ce$^-$

0.105

$\gamma\gamma$ (Re x ray + 0.06γ)/(0.105γ) ≥ 10 scin

J.W.Mihelich, Phys. Rev. 89, 907A(1953).

$^{22^m}$

τ_1 18^{m*} Re(slow n)

γ ~ 0.06*

p 18^{h}Re Szilard-Chalmers chem

W.Herr, Z.Naturf. 7a, 819(1952); *A.Flammersfeld, Ibid.

18^h

γ 0.153 sl

0.485

0.645

1.4

(0.65γ) (1.4γ)

C.C.Mullen, M.E.Petch, M.W.Johns, Proc. Roy. Soc. Canada 44, 194A(1950).

$_{78}Pt^{191}_{113}$?

γ 0.083 Ir(12-Mev d) chem; s π

0.096 not Pt(≤22-Mev γ)

0.173

J.B.Swan, W.M.Portnoy, R.D.Hill, Phys. Rev. 89, 907A(1953).

$_{78}Pt^{193}_{115}$

τ ~4^d s π

0.135

K: L_I : L_{II} : L_{III} = 100 : 120 : 0 : 240 (M4)

Ir(12-Mev d) chem, Pt(≤22-Mev γ) gives above 0.135 line strongly as well as 0.130 and 0.076 lines of Pt^{195} and Pt^{197}.

J.D.Swan, W.M.Portnoy, R.D.Hill, Phys. Rev. 89, 907A(1953).

$_{79}Au^{>183}_{<187}$

τ 4.3^m Pt(120-Mev p); chem

α 5.1 ic

J.O.Rasmussen, Jr., S.G.Thompson, A.Ghiorso, Phys. Rev. 89, 33(1953).

$_{79}Au^{195}_{116}$

γ 0.057 d 38^{h}Hg; s $\pi/2$

0.262

$^{30^s}$

K.Gopalakrishnan, A.de-Shalit, J.W.Mihelich, Phys. Rev. 89, 908A(1953).

Hg^{193} 80 113 — 10^h

γ	0.039	Au(p)chem; s$\pi\sqrt{2}$ ce$^-$(Hg)	
	0.102		
	0.032	s$\pi\sqrt{2}$ ce$^-$(Au)	
	0.120		
	0.258		

K.Gopalakrishnan, A.de-Shalit, J.W.Mihelich, Phys. Rev. 89, 908A(1953).

29^h τ_2 27^h Au(p) chem

K.Gopalakrishnan, A.de-Shalit, J.W.Mihelich, Phys. Rev. 89, 908A(1953).

Hg^{195} 80 115 — 38^h

γ	0.037	Au(p) chem; s$\pi\sqrt{2}$ ce$^-$
	0.123	

K.Gopalakrishnan, A.de-Shalit, J.W.Mihelich, Phys. Rev. 89, 908A(1953).

Pb^{200} 82 118

γ	0.139	Tl(60-Mev d) chem
	0.320	s$\pi\sqrt{2}$ ce$^-$

G.D.O'Kelley, UCRL-1243(1951).

Pb^{203} 82 121

γ	0.153	Tl(60-Mev d) chem	
	0.269	K/L = 2.3	s$\pi\sqrt{2}$ ce$^-$
	0.424		

G.D.O'Kelley, UCRL-1243(1951).

Pb^{210} 82 128

β^-	0.015	pc

No 0.0078γ (Cu x ray ?)

A.A.Jaffe, S.G.Cohen, Phys. Rev. 89, 454(1953).

Pb^{212} 82 130

γ	0.23863	s

$H\rho(F)$ = 1388.56 ± 0.21
H determined (2-20 kev) with e$^-$ accelerated through known potential.

D.I.Meyer, F.H.Schmidt, Phys. Rev. 89, 908A (1953).

Bi^{209} 83 126

μ	4.0400	$Bi(NO_3)_3$, D_2O;	I

$\nu(Bi^{209})/\nu(D) = 1.04684 \pm 0.00005$

Y.Ting, D.Williams, Phys. Rev. 89, 595(1953).

Bi^{212} 83 129

α	6.051*	s
	6.090	

*Value of 6.046 (Nature 167, 682) in error

E.R.Collins, C.D.McKenzie, C.A.Ramm, Proc. Roy. Soc. 216A, 219(1953).

Po^{212} 84 128

τ	2.9×10^{-7}s	$\beta\gamma$

T.Hayashi, Y.Ishizaki, I.Kumabe, J. Phys. Soc. Japan 8, 110(1953).

Th^{228} 90 138

(α)(0.083γ)(θ) does not agree with I = 0, I, 0
τ(0.083γ) < 10^{-8}s Source $Th(OH)_4$
No (0.086γ)(α) No $\gamma\gamma$

J.Battey, L.Madansky, F.Rasetti, Phys. Rev. 89, 182(1953).

U^{237} 92 145

τ		6.75^d	U^{236}(pile n)	chem
β^-	<20%	(0.080)		sl, scin $\beta\gamma$
	>80%	0.25		
γ		0.027		
		0.043		sl ce$^-$
	37%	0.059		
		0.165		K/L_1 < 0.2
	21%	0.207		K/L_1 = 4.8
		0.269		
	2.5%	0.334		
		0.370		
		0.430		

(0.21γ)(0.027γ) (0.21γ)(0.06γ) (0.21γ)(0.17γ) (0.25β) (0.21γ)
No (0.33γ)(γ) No 0.51β (<0.1%)
No photon with E_γ > 0.34 (<10% of 0.33γ)

F.Wagner, Jr., M.S.Freedman, D.W.Engelkemeir, J.R.Huizenga, Phys. Rev. 89, 502(1953).

Np^{234} 93 141

γ	0.177	U^{235}(14-Mev d)	chem
	0.442		s$\pi\sqrt{2}$ ce$^-$
	0.803		
	1.42		

G.D.O'Kelley, UCRL-1243(1951).

Pu^{238} 94 144

τ	89.6^y	

A.H.Jaffey, J.Lerner, ANL-4411(1950).

γ	0.0451		s$\pi\sqrt{2}$ ce$^-$
	vw 0.048 ?		

Pu from long n irradiation of Am^{241}

G.D.O'Kelley, UCRL-1243(1951).

Am^{241} 95 146

γ	0.059		s$\pi\sqrt{2}$ ce$^-$

[e_L^-(0.059γ)]/α = 0.28

G.D.O'Kelley, UCRL-1243(1951).

I	5/2	S

Large q indicated

M.Fred, F.S.Tomkins, Phys. Rev. 89, 318(1953).

Am^{242} 95 147 — 16^h

β^-	70%	0.628			s$\pi\sqrt{2}$
ϵ	15%		Am^{241}(pile n)		chem
γ I.T.	15%	0.035	α = 0.25	s$\pi\sqrt{2}$	Am ce$^-$
		0.038	α = 0.25		Pu ce$^-$
		0.053	α = 0.67		Cm ce$^-$

L_{III}/L_{II} x ray ratios: Am 4.9, Pu 1.3, Cm 1.0 cryst

No γ with E_γ > 0.06 s

G.D.O'Kelley, UCRL-1243(1951).

100^y β^- 0.593 Am^{241}(pile n) chem

γ	0.038	s$\pi\sqrt{2}$ Pu ce$^-$
	0.053	Cm ce$^-$

G.D.O'Kelley, UCRL-1243(1951).

Cm^{242} 96 146

γ	0.043	α_L = 0.8	s$\pi\sqrt{2}$ ce$^-$

G.D.O'Kelley, UCRL-1243(1951).